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THE BUSINESS OF TRANSPORTATION BY WATER

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River Traffic

PRODUCTION has been broadly developed. Distribution remains a problem and the key to it is cheap transportation. The Mississippi and her great tributaries have vast possibilities.

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Collisions

AN AUTOMATIC course recorder will not prevent collisions, but it will establish which ship was at fault, giving mechanical accuracy in place of vague approximation.

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Electric Dredge

THE self propelled seagoing diesel electrical hopper dredge recently completed at a cost of about $900,000 represents the highest development of the lowly sandsucker. Fully described and illustrated.

See Page 15

Cuts Fuel Costs

A LARGE operator of harbor craft has found, by exact records over a period of time, that a large sum has been saved since the fleet was converted from coal to oil burning.

See Page 21

The Rotorship

ANYONE who has taken a trip on the rotorship is compelled by the action of his own senses to acknowledge that the vessel runs, even though it may be difficult to understand why.

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Wharf Fires

ALWAYS after a fire valuable lessons can be learned in improving methods of fire prevention. There were reasons why the great pier fire discussed in this issue was so extensive and disastrous.

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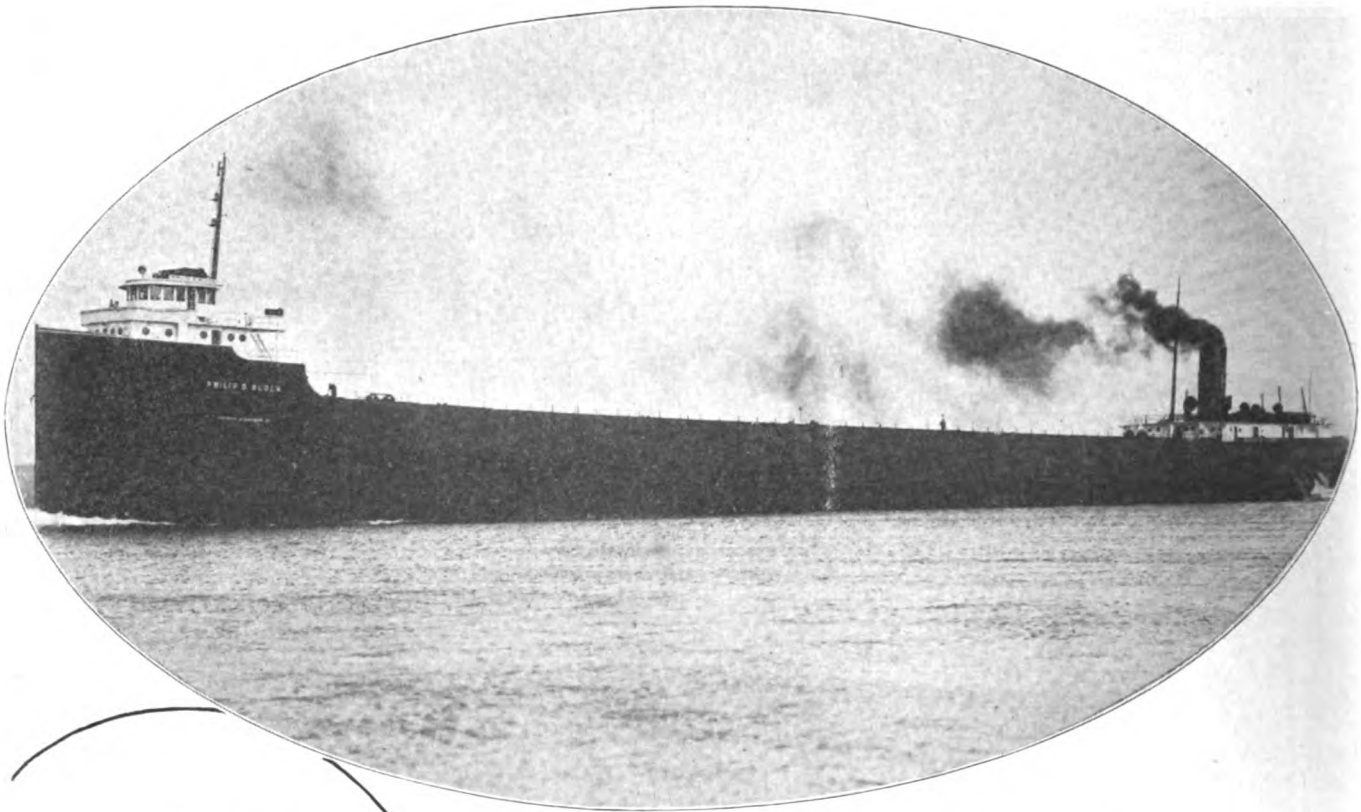

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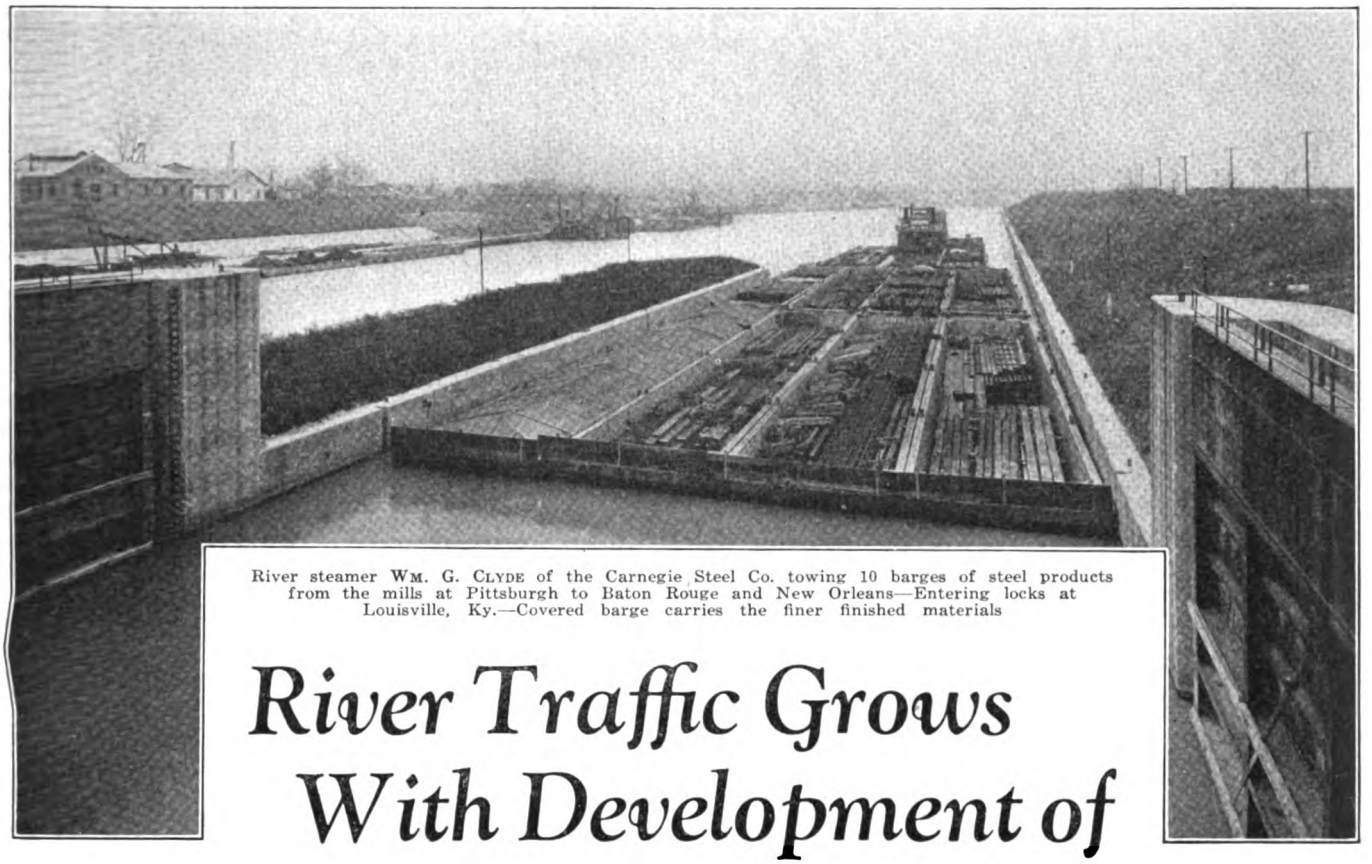

River steamer WM. G. CLYDE of the Carnegie Steel Co. towing 10 barges of steel products from the mills at Pittsburgh to Baton Rouge and New Orleans—Entering locks at Louisville, Ky.—Covered barge carries the finer finished materials

River Traffic Grows With Development of Great Waterway

BY J. F. FROGGETT

TWO most obstinate difficulties of several that have barred the way to successful navigation of the 6520 miles of inland waterways embraced within the Mississippi valley, main artery of the flourishing Middle West, are in active process of being wiped out. In the case of the Ohio river, the most important industrial tributary of the Mississippi it is intended that they shall be wiped out specifically and positively within the next three years after 20 years of legislative and engineering endeavor. These two hindances have been, first, the shallowness of the water in the channel during the summer or real season of navigation; and second, the lack of a type of vessel suited to carry the heavy cargoes demanded by the quantity-production manufacturing methods of today. The shallow channel had been definitely known but allowed to remain untouched for 150 years after the first French explorer, Celeron de Bienville, tried to navigate it in 1759 and scraped the bottoms off even his light birchbark canoes. The summer of that year he attempted to descend the head waters of the Allegheny river, which joins with the Monongahela river at Pittsburgh to form the Ohio.

But by 1929 it is expected that the Ohio river channel difficulties will have been smoothed out. By that time the 600 miles of 9-foot depth of water now open from Pittsburgh to Louisville, Ky., will have been lengthened to 1000 miles, thanks to congressional appropriations totaling so far $67,000,000 and the efforts of United States engineers and private contractors. This additional 400 miles of 9-foot channel depth will cover the territory from Louisville to Cairo, Ill., where the Ohio empties into the Mississippi river. The building of the last half dozen locks and dams, costing $1,400,000 each, over that remaining 400-mile stretch will have been completed by 1929. The entire Ohio river improvement system will then have cost the federal government a total of $85,000,000. By means of the 53 locks and dams built along this river from Pittsburgh to Cairo, Ill., a vessel leaving the latter city will

Cut Handling Costs

This article by Mr. Froggett covers the history of the development of the Ohio river up to the present time and anticipating its completion in 1929. In a second article to be published in an early issue of Marine Review, the author will discuss in detail the present and proposed Ohio river terminals and facilities together with costs involved in the loading, discharge and transfer of cargoes.

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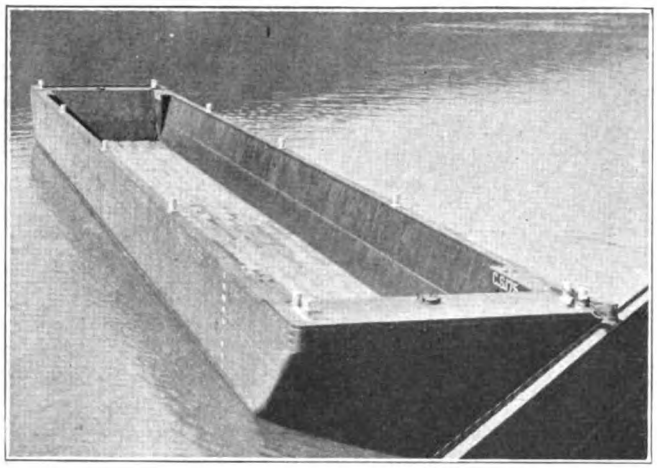


Typical river barge with scow bow and stern, built entirely of steel. These barges are especially designed and constructed for carrying steel, coal, and other bulk freight on the inland waterways, such as the Ohio and Mississippi. For protection of freight of finished classification some barges are covered

be lifted 426 feet by the time it reaches Pittsburgh. The highest single lift is at Louisville, 30 feet, but the average of the others is about 8 feet.

Inadequate Cargo Handling Facilities

The third and fourth difficulties that have prevented extensive use of the Ohio river for bulk commodity transportation have been lack of suitable terminals other than a gangplank onto a rough rip-rap wharf or even a mud bank; and inadequate transfer arrangements with the railroads and motor truck roadways that criss-cross the Ohio every few miles along its entire length. These two latter hindrances and the methods now in course of preparation to overcome them will be discussed in another article.

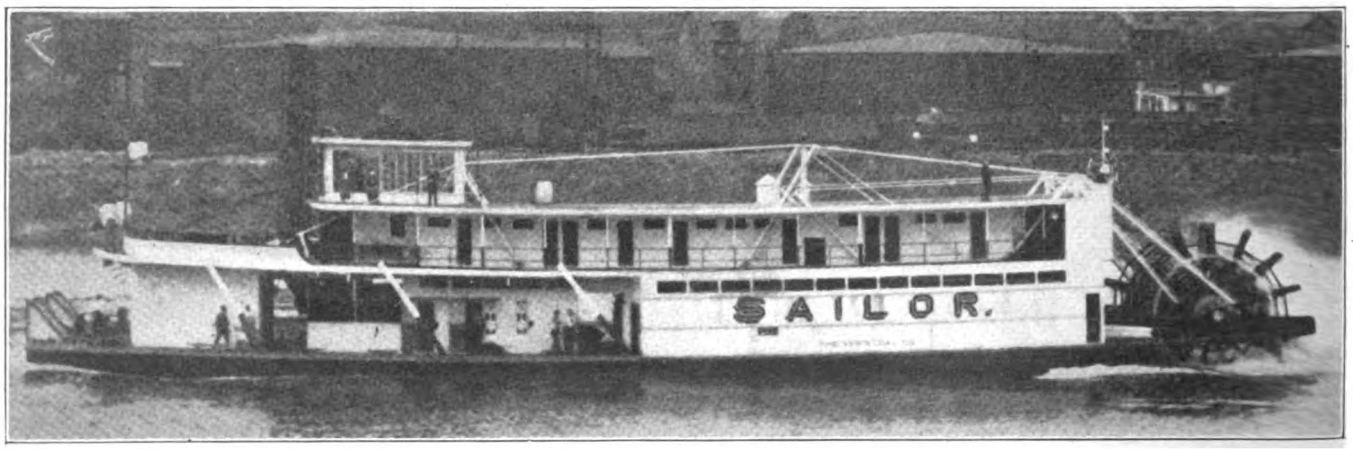
Five towboats, handling barges loaded with over 30,000 tons of steel products, passed down the Ohio river on May 1, the largest tonnage ever handled past Wheeling in one day in the history of Ohio river navigation. The towboat, SAILOR, of the Vesta Coal Co., subsidiary of the Jones & Laughlin Steel Co., Pittsburgh, bound for New Orleans, handled the biggest single tow, consisting of 6400 tons of steel pipe, 3800 tons of miscellaneous freight, mostly kegs of nails; and 850 tons of coal. Next in size came the WILLIAM G. CLYDE, of the Carnegie Steel Co., named after its president, towing to Memphis 6000 tons of steel products and 1000 tons of coal. The DUQUESNE, scheduled for Baton Rouge, also a Carnegie Steel towboat, passed down with 5100 tons of steel. The government towboat, IOWA, chartered to the Goltra Barge Co., of St. Louis, headed for Vicksburg, followed with 5850 tons of steel pipe. Last to leave was the CONQUEROR, of the Wheeling Steel Corp. fleet, with 5000 tons of steel pipe for Memphis.

While the usual river type of shallow-draft, high-built stern-wheel or sidewheel steamer, such as Mark Twain wrote about and piloted, still is being employed on the Ohio and Mississippi rivers and their important tributaries for the transportation of regular passenger and miscellaneous package freight, the major portion of the bulk freight is being carried in open or closed-top wooden and steel barges, handled by powerful towboats. The steel barge is by far the more popular in the new construction. Being built of steel plates and shapes, it withstands the wear and tear of hard river usage. A new type of squat, powerful oil-engined towboat is growing up alongside the coal-burning stern-wheeler, both of these vessels being employed to nose the fleets of barges up and down the rivers. The new type of towboat has a propeller housed in a tunnel built into the boat's stern which permits the vessel's draft to remain comparatively shallow. The power is furnished by oil-burning engines, mostly of the diesel type.

Individual carrying lines, open to use by the general shipping public, such as the W. C. Kelly Barge line, Charleston, W. Va., plan to replace in service this spring a number of these modern towboats and standardized steel barges. The Kelly Barge line recently had built and launched by the Chas. Ward Engineering Works at its yards at Charleston, W. Va., the newest idea in river towboats, the GEORGE T. PRICE, named for the president of the Kelly Axe & Tool Co., also of that city. The length of this vessel overall is 126 feet, molded depth 7 feet, molded breadth 26 feet, draft 5 feet, displacement loaded 330 tons, bunker fuel capacity 52 tons and speed 10½ statute miles per hour. It has two 360-horsepower full diesel engines.

A Diesel-Engined Towboat

Two special features are embodied in the construction of the PRICE. One is a tunnel built into the stern which houses twin screws 5 feet in diameter, which does not interfere with the draft of the steamer. The other includes the patented parallel rudders which provide for absolute control of both the vessel and its towing barges. This towboat is designed for handling six barges, representing a total displacement including the towboat of 3875 tons, at 6¼ miles per hour in



A TYPICAL STEAM RIVER TOWBOAT OWNED BY THE VESTA COAL CO., PITTSBURGH, BUILT IN 1924 BY THE MARIETTA MFG. CO.—A STEEL HULL STERN WHEELER WITH TWO TANDEM COMPOUND STEAM ENGINES AND WITH RIVER TYPE BOILERS BURNING COAL

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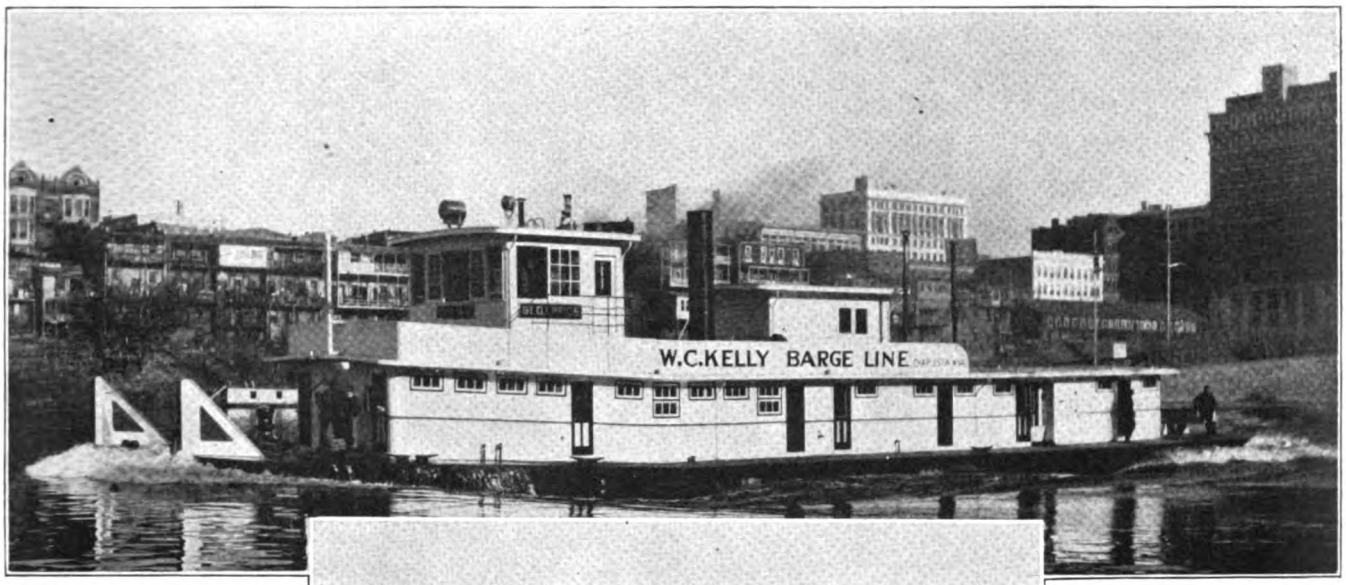
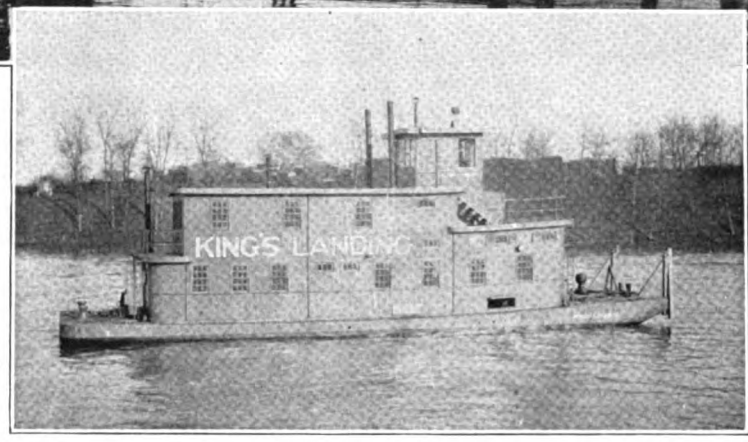


Above—Modern twin screw oil engined steel hull river towboat George T. Price, built by Chas. Ward Engineering Works, owned by the W. C. Kelly Barge line both of Charleston, W. Va. Placed in service on the Ohio river this spring—Total horsepower is 720—Length, 126 feet; width, 26 feet; depth 7 feet



At left—King's Landing, a tunnel stern, twin screw, oil engined, steel hull river towboat completed this spring by the Nashville Bridge Co. for the Kosmos Portland Cement Co.—Total horsepower in two engines 240—Length, 75 feet 6 inches, width, 19 feet and depth 5 feet 9 inches

still water with the barges arranged two abreast. The owner's quarters on this vessel, as well as quarters for the officers and crew, with shower-baths, etc., the galley with refrigerators, etc., are all as splendidly equipped as are the finest ore carriers on the Great Lakes or freighters on the Atlantic.

The Chas. Ward Engineering Works is building for the W. C. Kelly Barge Line nine steel barges, each to carry 500 tons of freight. These barges are 150 feet long, 8 feet 6 inches deep and 26 feet wide. Designed for carrying miscellaneous freight protected from the weather, they are covered. The three-part coverings are hatch-covers, standardized to suit the terminal unloading equipment on the riverbank, each hatch having a clear unloading space of 31 feet 4 inches. The Kelly Barge line itself is building electrically-operated standardized concrete terminals at Glassport, Pa., Charleston, W. Va., Evansville, Ind., and Memphis, Tenn. These standardized terminals will supplement savings from the economical water transportation by permitting quick loading and unloading of miscellaneous package and bulk freight at various river ports from Pittsburgh southward.

The most suitable and economic unit for this shallow river transportation is the modern steel barge, a glorified wooden or steel type of the oldtime river flat boat. In pioneer days, thousands of immigrants with all their belongings floated down the Ohio to the newly opened lands in the then Northwest territory. Abraham Lincoln, afterwards President of the United States, with his cousin John Hanks, built out of hewed plank such a flatboat and in 1839 floated it with merchandise down the Illinois river and thence down the Mississippi to New Orleans. There he first saw a slave auction in the streets and became confirmed in his original ideas regarding negro slavery. This flatboat traffic down the Mississippi to New Orleans as early as 1788 had attained an annual value of $1,500,000; and by the following year, $2,000,000 in lumber, grain, flour, pork and other merchandise.

Flatboats Carry 1000 Tons

With the advent of the steamboat and its adaptation to the shallower inland waters, came the rise on the Mississippi river and its tributaries of the palatial side-wheel and later stern-wheel steamers such as the famous NATCHEZ and LEE, whose race north was an historic incident of the ante-bellum days. Rapid development of the railroads after the close of the Civil war in the West and South, attracted away from the river the passenger and highly profitable freight, which led to the decay of the Mississippi river traffic and the river vessels themselves. Under modern traffic conditions they, because of their peculiar construction, could not carry enough freight to be profitable. This led shippers to revert to the pioneer flatboat type of vessel; hence, the modern barge, which carries a thousand tons instead of hundred tons as on the old-fashioned steamers.

The American Bridge Co. for some years has been building several hundred standardized river coal barges at its yards at Ambridge, Pa., for the Carnegie Steel Co., the American Steel & Wire Co. and other subsidiaries of the United States Steel Co. These barges are built of steel plates and shapes, are 175 feet long, 11 feet deep and 26 feet wide, tapering to 19 feet at the bottom. Each is designed to carry 1000 tons of steel products, coal and other bulk cargo. However, smaller barges down to 300 to 600 tons carrying capacity also are built for trading with the smaller cities en-route, particularly in sand, gravel and coal.

Close approach of the completion of the canalization of the Ohio river by

(*Continued on Page* 34)

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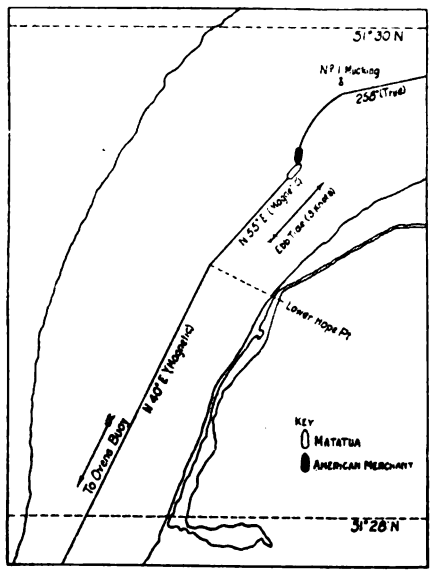
U. S. Ship Loses Collision Case

But Automatic Course Recorder Evidence Nearly Turned the Tables on Appeal—The Decision of the Lower Court Was Reluctantly Supported

BY F. S. CLIFFORD

SINCE the famous case of H. M. S. HAWKE and S. S. OLYMPIC, in which the suction theory was propounded as a probable cause of the collision, there has not been heard in the British courts a case that aroused so much purely navigational interest



CASE A—DIAGRAM SHOWING THE APPROACH OF THE TWO VESSELS, APPROXIMATELY AS RELATED BY THE PILOT OF THE S. S. MATATUA

as the collision between MATATUA and AMERICAN MERCHANT.

In the former instance a point that loomed large during the proceedings was the loss overboard, from the cruiser, of the note book containing the orders and movements of that vessel. This necessarily involved the absence of important documentary evidence, but nevertheless the HAWKE won the case.

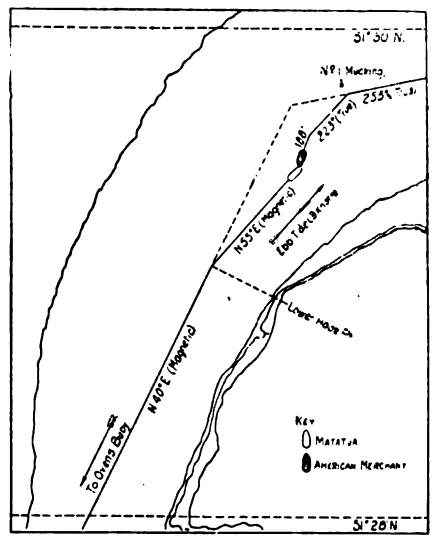
The case to be considered now is precisely the reverse, as, in addition to the usual log book and other documents, an automatic Sperry gyro compass record of the movements of the AMERICAN MERCHANT was put in evidence. In the opinion of the appeal judges and law lords, only the gyro record made the appeal to the higher courts possible, but although the decision of the admiralty court judge in favor of MATATUA was upheld, the judgments given in the house of lords are of much more than usual interest, though perhaps somewhat difficult to comprehend.

The Legal Phase Drags

The process of the law operates slowly, and the collision which occurred on April 16, 1924, was not finally disposed of in the house of lords until recently.

Reference to the accompanying diagrams will make it clear that there were put forward three different stories as follows:

Case A—The pilot of the MATATUA His case was that he altered course 15



CASE B—DIAGRAM SHOWING THE APPROACH OF THE TWO VESSELS, APPROXIMATELY AS RELATED BY THE THIRD OFFICER OF THE S. S. MATATUA

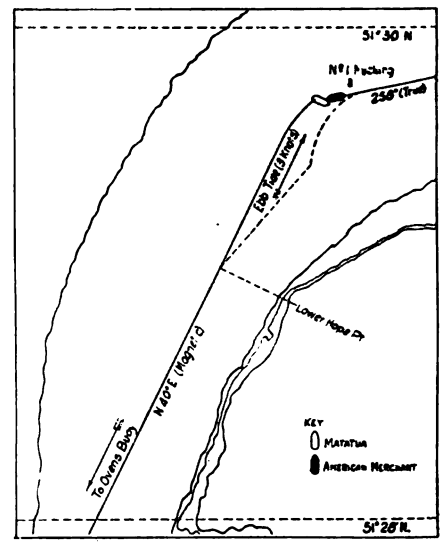
degrees at the right time and place in order to put his ship on the next course to pass the right distance from No. 1 Mucking buoy. He observed the MERCHANT pass that buoy on the correct course when she altered to port so as to come on to her next up river heading. The alteration should have been about 35 degrees but instead of steadying so as to pass port to port, the MERCHANT continued her swing (a further 35 degrees, making a total of 70 degrees in not more than 2½ minutes) and struck the port bow of MATATUA with her stem.

As a result of the collision and the subsequent manoeuvering, the two vessels remained locked together and he alleged that the bow of the MERCHANT swung to starboard something like 40 degrees.

Case B—The third officer of the MATATUA. His case differed from the pilot, inasmuch as he alleged that the MERCHANT did come on to her proper up river course, steadied for an appreciable time and then altered course again to port—or actually starboarded into his ship.

Case C—The pilot of the AMERICAN MERCHANT. His case was that he passed close to No. 1 Mucking buoy on the correct course, but was unable to alter to the southward and come on to the next up-river course, because it was reported that MATATUA would port and open her red light, and pass the MERCHANT port to port as she should and ought to have done.

That the MERCHANT was being forced to keep close to the patch to the northward and that the collision was caused by the MATATUA not porting until she closed to a distance of about



CASE C—DIAGRAM SHOWING THE APPROACH OF THE TWO VESSELS, APPROXIMATELY AS RELATED BY THE PILOT OF THE S. S. AMERICAN MERCHANT

150 to 200 yards with the result that his stem struck the other vessel.

After the collision the vessels remained locked together, but he alleged that the effect of his left handed propeller going astern, and the MATATUA

(*Continued on Page* 38)

The author was present at the inquest and also during the hearings in the appeal court and the House of Lords when this case was under discussion. This article is reprinted, with permission, from the *Sperryscope*, published by the Sperry Gyroscope Co., Brooklyn, N. Y.

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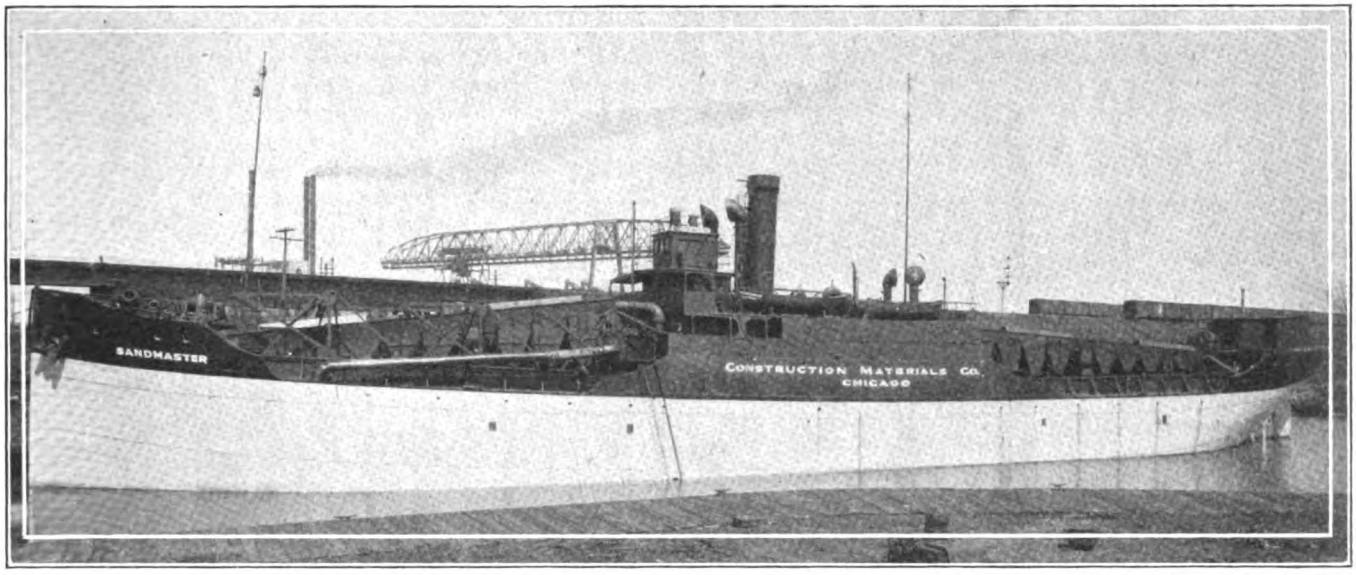

Diesel electric hopper dredge SANDMASTER nearing completion at the Cleveland plant of the American Ship Building Co. April 10, 1926

Complete Most Modern Dredge

Diesel Electric Seagoing Hopper Dredge Sets New Mark for Efficient Power and Skillful Design in Special Operating Features

BY A. H. JANSSON

NECESSITY, it has often been said, is the mother of invention but fortunately for progress enterprising individuals of vision and courage carry on into new and untried fields beyond the immediate needs of the present in order to improve and perfect the tools and processes which they use. The recently completed diesel-electric hopper dredge SANDMASTER is a case in point; and this can be said with complete justification whether or not in practice this vessel turns out to be greatly superior, as fully anticipated, to the usual or accepted type. It is the spirit of enthusiasm and courage to try for ever greater efficiency and perfection that counts and it is this spirit that has placed our country industrially ahead of all the nations of the world.

Buys Shipping Board Hull

During 1924 J. R. Sensibar, president of the Construction Materials Co., Chicago, negotiated with the United States shipping board for the purchase of the LAKE WEIR, one of the laid up surplus lake-built ocean freighters turned out in such quantities during the war, with the view of converting her into a diesel electric hopper dredge sand boat. She was finally acquired in the fall of 1924 and taken over at Newport News, Va. The LAKE WEIR sailed for the Great Lakes under her own power stopping at New York and at Buffalo en route where she took on board the new diesel engines that were to be installed. Arriving at Cleveland Dec. 17, 1924 arrangements were soon made for her complete rebuilding and conversion, the work to be done at the Interlake Engineering Co., a small ship repair plant in that city. It was fully expected that the job would be completed before the close of navigation in 1925. The work was not however completed in time. On Dec. 17, 1925 after finishing all the hull construction and the installation of the main engines and auxiliaries, the LAKE WEIR now renamed the SANDMASTER was towed to the Cleveland plant of the American Ship Building Co., for drydocking, the fitting of struts and twin propellers, and the lining up of shafts and electric propelling motors.

Diesel Installations on the Great Lakes

Is there a future for the diesel and diesel electric drive for vessels on the Great Lakes? A summary of comparatively recent installations would indicate that there is greater activity along this line than is generally recognized. Among these are the Henry Ford, Benson Ford, Twin Cities, Twin Ports, Steelvendor, Steelmotor, Steel Electrician and Sandmaster, completed, and the Steel Chemist; barge Constitution, two tugs and a twin screw cement boat, under construction. The diesel tug boats mentioned above are in the nature of repeat orders after a considerable period of successful operation with boats similarly engined. This in itself is a most significant indication.

Trial Trip Proves Successful

Here the SANDMASTER remained throughout the winter until finally on May 5 this year she was given a trial during which all machinery, propelling, pumping, and auxiliary, prove satisfactory even beyond expectations. On May 6 the SANDMASTER sailed for Chicago where she was immediately placed in service sucking sand from the lake bottom 40 miles away carrying it to and discharging it at the company's plant in South Chicago.

The SANDMASTER representing an investment of nearly $1,000,000 is undoubtedly the most advanced vessel of her type in the world today. Before going into a detailed description it will be interesting to briefly look into the history of the development of the sand industry to the point where so great an expenditure for a single unit can be legitimately justified and what is of more practical importance financed.

Not over 15 years ago the idea of pumping sand out of the lake bot-

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tom into a ship and then moving the ship under its own power to the vicinity of the place where the sand was to be unloaded, and unloading by pumping through a pipe and delivering it at great distances from the vessel had not occurred to anyone as a practical method.

About that time construction had commenced on the new Field Museum of natural history at its present location, on the Lake front at the foot of Roosevelt road, Chicago. Difficult engineering problems were involved.

Water to the depth of 16 feet covered the area where the great steel and marble building was to be erected, and the main floor was to be 50 feet above datum. The building and terrace occupy about 11 acres. Under the circumstances this area had to be filled in, in some manner, to a depth of 66 feet plus the amount of settlement of the soft bottom of the lake at that point. The first fill to a height of 6 feet above water was made with city waste, largely street sweepings excavations and ashes. Into this foundation 60-foot piling was driven in clusters and cut off below datum. On top of these clusters of piles were cast reinforced concrete columns 43 feet high. When in place the ground looked like a forest of concrete columns with no cross ties between. The basement floor of the building was to be on about a line with the top of these columns, with the steel and marble structure of the building carried from there up.

A Practical Solution Offered

It was discovered that the dumpings contained such a large percentage of voids that it furnished very little lateral support to these columns and that it would be necessary to fill in with something solid to make the structure safe. For this purpose it was decided to use tamped sand as a fill. But it became a problem at once to move so enormous a quantity of sand to the site and to get it in place. No ordinary methods of hauling and delivering sand seemed practical. Finally a new solution was suggested by J. R. Sensibar who had practically been brought up in the sand business. The problem was solved.

Build Floating Equipment

A steamboat was constructed with hoppers from coaming down to the keelsom. Machinery was designed and installed on board for filling these hoppers with sand and a method was developed for emptying the hoppers by pumping the sand through a pipe line run from the boat landing to the museum area. The vessel went to the Indiana and Michigan shore more than 40 miles away, loaded the

Diesel Electric Dredge Sandmaster

Particulars

Owner—Construction Materials Co.
Builder—American Ship Building Co.
Converted By—Interlake Engineering Co.
Classification—American Bureau—Lloyds.

HULL

Length Overall— 263 feet; length between perpendiculars, 251 feet; beam, 43 feet 6 inches; depth, 20 feet; draft loaded, 18 feet; capacity, 3000 tons of sand; bunker capacity in diesel engine oil, 182 tons.

MAIN MACHINERY

Main Engines—Two Worthington diesel engines, 4-cycle, 6-cylinder, 600-horsepower each at 200 revolutions per minute. Two main generators direct connected to the diesel engines, each 400-kilowatts at 240 volts; two auxiliary generators mounted on the main generator shafts, each 50 kilowatts. Two propelling motors, direct current, each of 500 brake horsepower at 130 revolutions per minute and 240 volts, direct connected to propeller shaft.

Sand Pumps—Two 18-inch centrifugal of Construction Materials Co. type driven by 400-horsepower, direct current 400-450 revolutions per minute General Electric Motors.

Jetting Pumps—Two 8-inch centrifugal Worthington type. 1750 gallons per minute driven by 125-horsepower General Electric direct current motors at 1700 revolutions per minute, pump up to 75 pounds pressure.

Cooling Pumps—Two 4-inch centrifugal Worthington with 10-horsepower General Electric direct current motors at 1150 revolutions per minute.

Bilge and Ballast Pump—One 3-inch discharge Worthington horizontal duplex with 5-horsepower General Electric motor.

Sealing Pump—One 1½-inch discharge Worthington horizontal duplex with 5-horsepower General Electric motor, for sealing sand pumps.

Fire Pump—One 5-inch suction and 4-inch discharge Worthington two stage centrifugal with 50-horsepower, 1700 revolutions per minute General Electric motor.

Fuel Oil Transfer Pumps—Two 3-inch discharge Worthington horizontal duplex with 5-horsepower General Electric motors.

Sanitary Pump—One 1½-inch discharge Worthington horizontal duplex with 5-horsepower General Electric motor. This pump has connections to water service on shaft bearings, ice machine and distiller.

Boiler Feed Pump—One 1-inch Buffalo centrifugal with 3-horsepower General Electric motor.

Fresh Water Pump—One 1-inch discharge Worthington centrifugal with 2-horsepower General Electric motor.

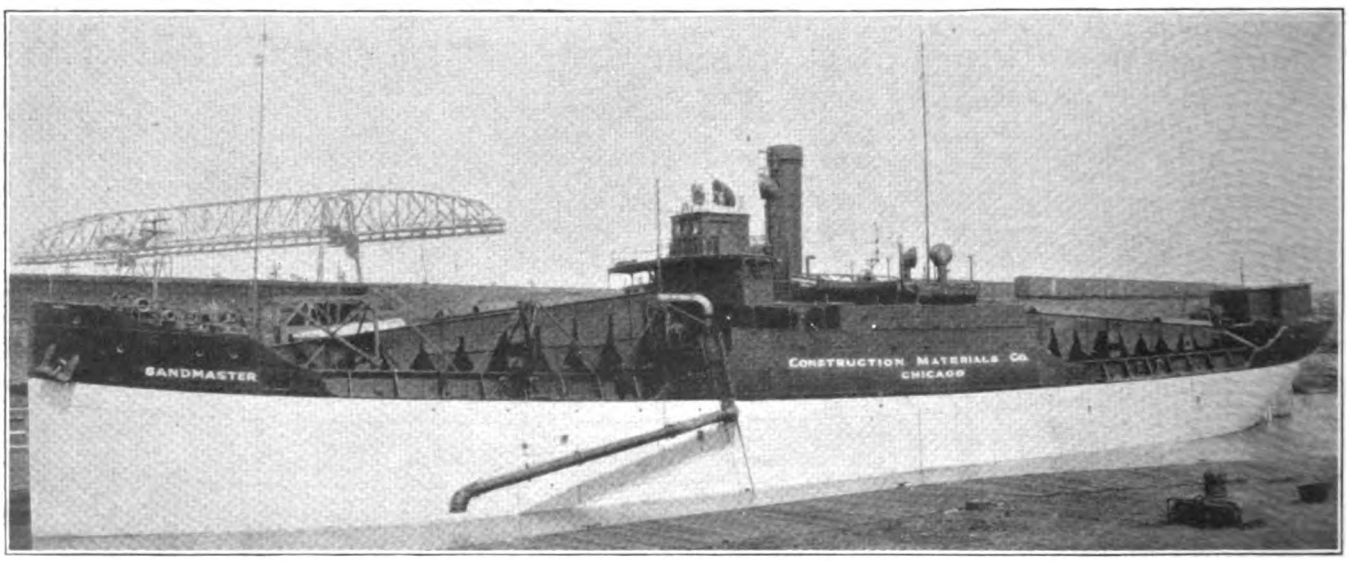
Auxiliary Cooling Pump—One 1-inch discharge Worthington centrifugal with 1-horsepower General Electric motor.

Auxiliary Generator—One Worthington 2-cylinder, 2-cycle solid injection diesel engine of 60-horsepower, driving an Engberg 40-kilowatt generator.

Motor Generators—Two, with 16½-horsepower 240-volt motors, driving 10-kilowatt, 115-volt generators at 1700 revolutions per minute.

Oil Purifiers—Two DeLaval.

Hot Water Tank—One, with separate Para coil heaters with thermostat regulator.



THIS VIEW SHOWS THE FLEXIBLE SUCTION HOSE WHICH IS LOWERED SO THAT THE END TOUCHES BOTTOM WHEN SUCKING SAND AND THE GUIDE ON THE SIDE OF THE SHIP IN WHICH IT MAY BE RAISED OR LOWERED

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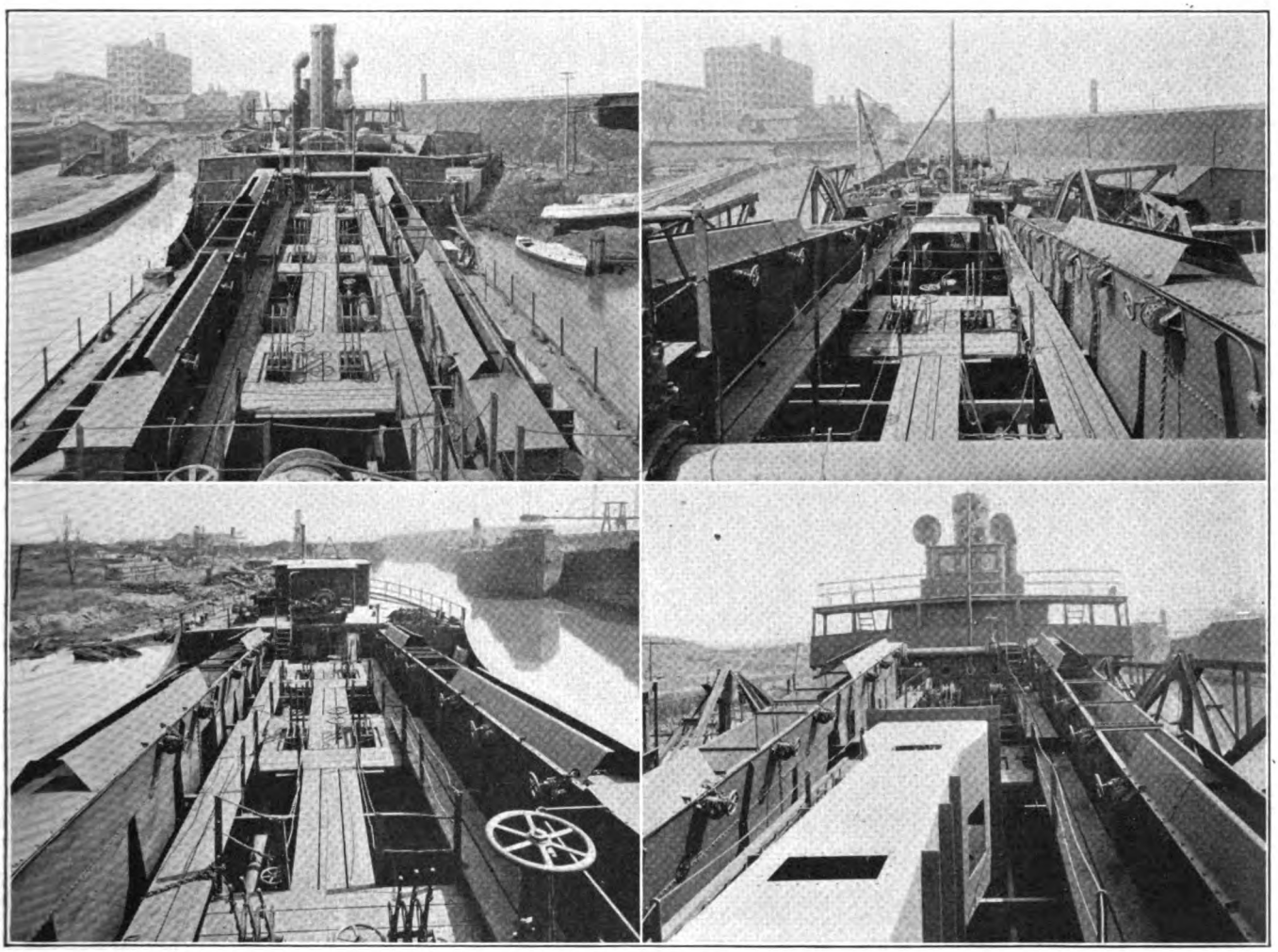
hoppers with sand, returned under its own power to the dock at the museum, connected up its pipe lines to the shore line and by the same pumps that loaded the vessel pumped out its cargo of sand into the specified area.

It was necessary to dredge a channel over a half mile in length in order to allow the vessel to come in with a full cargo. Many problems had to be solved and difficulties overcome to make this entire operation successful. Dry sand brought in by boat was carried over elaborate belt conveyors and a dyke was built up around the area. The space under the building itself was filled by pumping from the steamer L. L. BARTH. The fill was made in one season, economically and efficiently, and careful surveys proved that there was practically no settlement or lateral movement in the building foundations after the job was done.

An Industry Is Built Up

In this way the foundation was laid for the industry that today warrants the building of such a boat as the SANDMASTER illustrated and described in this article. Though Mr. Sensibar had acted on the Field Museum job as an individual, he succeeded in interesting his company, problems were met and solved, additional equipment was acquired from time to time until now this company is particularly expert in sand fills and is a leader in the industry as a whole. Many jobs similar to the one at the Field Museum have since been done by this company. Among these are the fill at the plant site of the Continental motors Corp. at Muskegon, Mich., the Johns-Manville Co. plant site at Waukegan, Ill., the Youngstown Sheet & Tube Co. site at Indiana Harbor, Ind., the outer drive at Twenty-third street viaduct on the Lake front at Chicago for the South Park commissioners, a beach on the Lake front at Thirty-first street in Chicago and many others.

The company stores material on its docks in Chicago, Grand Haven, and Muskegon, Mich., by the same method. Fills can now be made to finished contours with a minimum of settlement to carry heavy structures without piling. Pace has been kept with the growth of the demand for this kind of work by the addition of improved and larger equipment. About a year ago a new steel steamship the SANDCRAFT was brought out. This vessel will carry 3000 tons of sand as cargo and can unload it 5000 feet from the side of the ship at the rate of 1500 tons per hour. The equipment is along the lines of the idea developed on the original steamer L. L. BARTH but with many refinements. The SANDCRAFT has been in successful operation since she was commissioned.



VIEWS OF THE RECENTLY COMPLETED DIESEL ELECTRIC HOPP ER DREDGE SANDMASTER TAKEN APRIL 10, 1926 AT CLEVELAND—(UPPER LEFT)—AFT HOPPER LOOKING FORWARD—(UPPER RIGHT)—FORWARD HOPPER LOOKING FORWARD—(LOWER LEFT)—AFT HOPPER LOOKING AFT (LOWER RIGHT)—FORWARD HOPPER LOOKING AFT

A New Type Of Boat

This brings us to the diesel electric hopper dredge SANDMASTER which was placed in commission by the company in May this year. This vessel will handle 3000 tons of sand per hour through a maximum pipe line of 8000 feet and will build a hill up to 90 feet in height at this distance. She is 263 feet long overall, 43 feet 6 inches in beam, 20 feet in molded depth and is propelled by twin screws. The company now owns and operates four vessels and it has an out-

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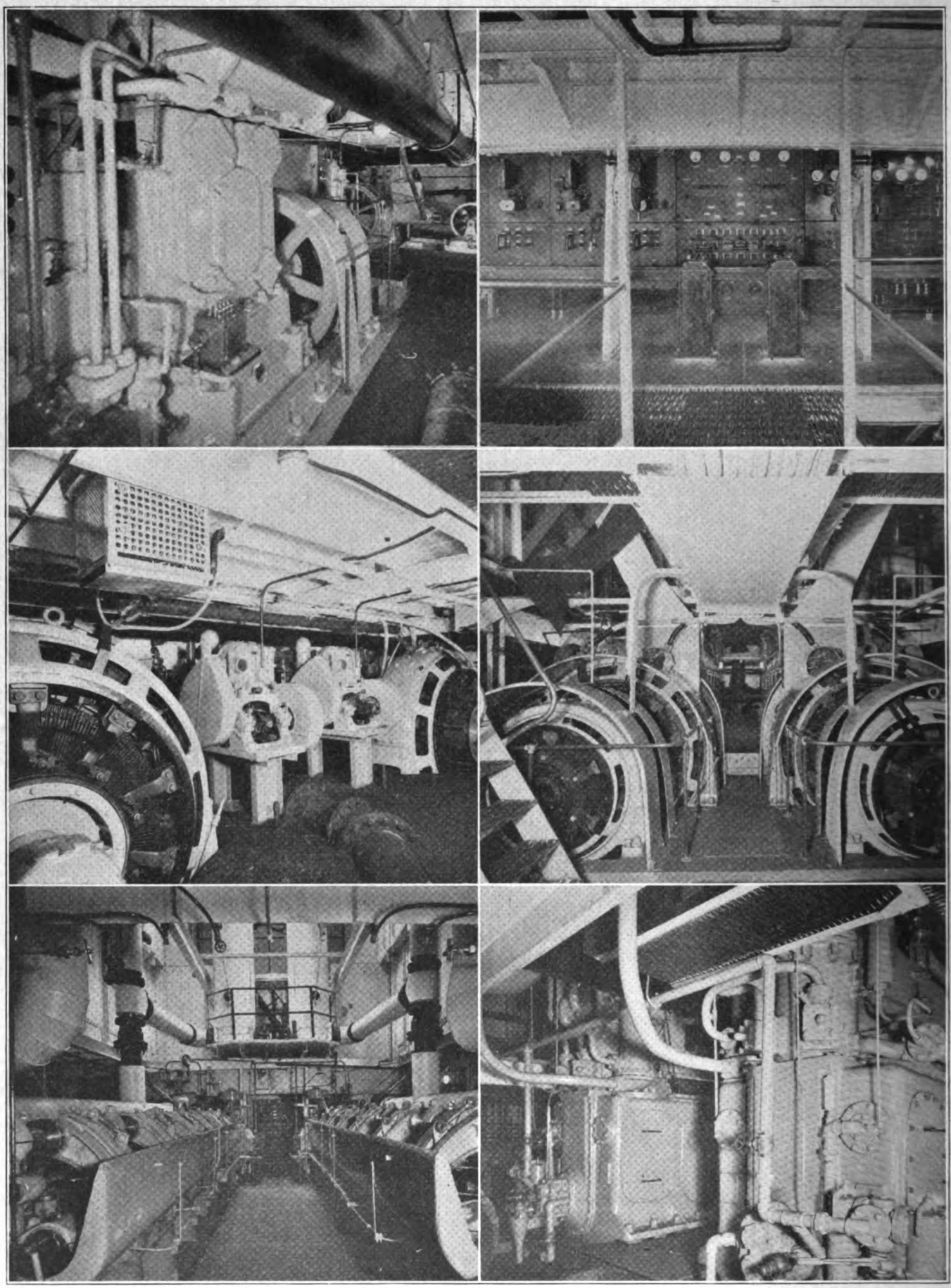

ENGINE ROOM VIEWS OF THE DIESEL ELECTRIC HOPPER DREDGE SANDMASTER—(UPPER LEFT)—AUXILIARY GENERATOR AND AIR COMPRESSOR UNITS—(UPPER RIGHT)—MAIN SWITCHBOARD—(CENTER LEFT)—MAIN PROPELLING MOTORS—FUEL TRANSFER AND FIRE PUMPS—(CENTER RIGHT)—MAIN DIESEL ENGINES, MAIN AND AUXILIARY GENERATORS—(LOWER LEFT)—UPPER GRATING BETWEEN MAIN DIESEL ENGINES, FUEL PUMPS, MAIN INJECTION BOTTLES, FUEL OIL BURNING SYSTEM AND BOILERS —(LOWER RIGHT)—FORWARD END MAIN ENGINES SHOWING LUBRICATING OIL PUMPS STRAINER AND COMPRESSORS

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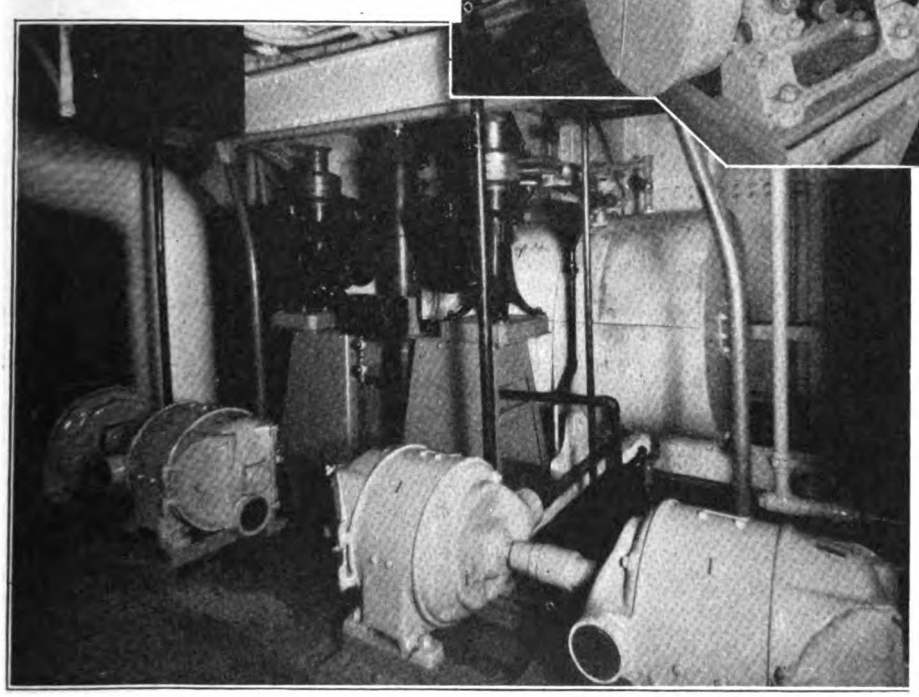
put of over 3,000,000 tons per year. When Mr. Sensibar started in business over 20 years ago it required 30 men to load 1000 tons of sand per day. The SANDMASTER with a crew of 19 men can handle 3000 tons per hour. Such has been the development in this industry in the last 20 years no inconsiderable part of which development is due to Mr. Sensibar who has taken out many patents covering various methods and mechanical developments used in this business.

In converting the ex-LAKE WEIR to the modern diesel electric vessel shown in the accompanying illustrations the experience of years and a great deal of thought was applied in order to turn out the most efficient unit possible. A method has been worked out of proportioning the sand and the water in relation to each other, and the percentage of solids fed to the pumps is adjusted with precision to give the pumps all the solids they can handle at given heads without the danger of clogging the pipe lines or the pumps, and stopping them.



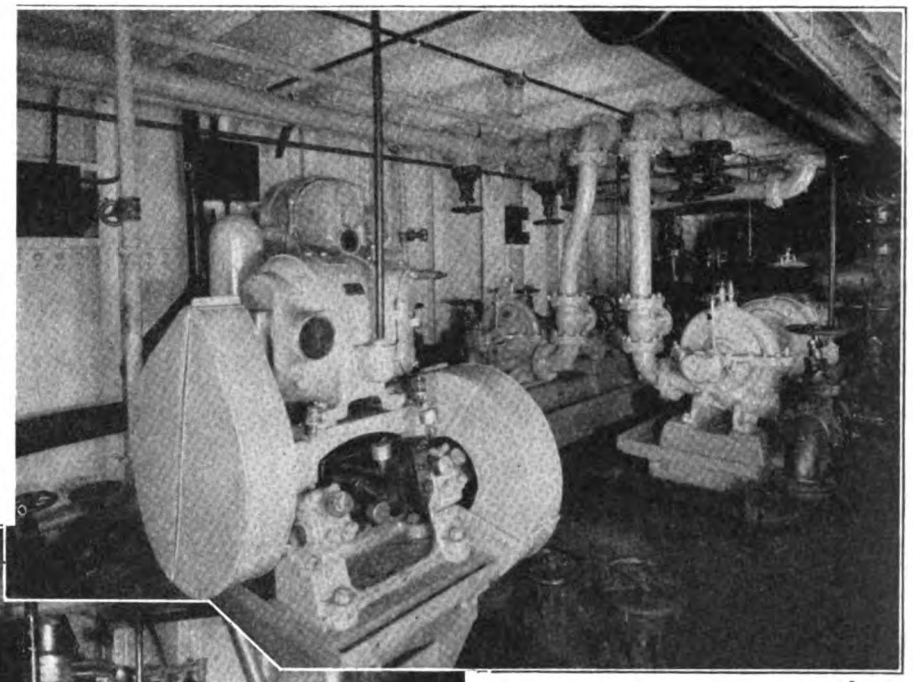
DELAVAL OIL SEPARATORS AND MOTOR GENERATING SETS CONVERTING FROM 240 VOLTS TO 115—M. S. SANDMASTER

To make the entire operation a success there must be proper coordination between the crew on shore and the vessel. This was a very important consideration in deciding on diesel electric equipment for the SANDMASTER. In addition to the saving of crew and fuel cost it is anticipated that there will be a considerable increase in efficiency due to the elimination of delays in starting, stopping, getting under way, fueling, adjustments necessary in steam equipment and the continual variance in head of the sand pumps, as no two jobs are ailke either in length of pipe line or height of fill.

The equipment in the new boat is so arranged that all these adjustments can be made in a few minutes because of the electric drive whereas to do the same on a steamship such as the SANDCRAFT frequently requires days.

The work of converting the ex-LAKE WEIR began by completely removing the original boilers, engines, auxiliary machinery, hold bulkheads and part of the decks. A portion of the tank top in the engine room was removed and extra intercostals were put in to give a solid foundation for the two diesel engines. The fire room bulkhead was taken out so that the present machinery space extends from the after engine room bulkhead through the old boiler room to a point two frame spaces forward of the old bulkhead at the forward end of the old fire room.

As the cubic space required for sand is comparatively small there was ample room to build appropriate sloping side bulkheads giving a hopper shape to the holds. The old coamings of the hatches were removed, coamings farther outboard equal in height to about the old ship's bulwarks were



BILGE SEALING AND CIRCULATING PUMPS

put in. The result thus far was a single continuous open hold forward and a similar hold aft, each shaped like a truncated inverted triangular prism. These holds at the deck are considerably wider than the former hatches and are finished off by deep and very strongly constructed coamings, adding strength and stability.

Important Structural Features

Fore and aft hoppers are run above the holds on each side. It is into these hoppers that the fluid sand and water is pumped. Along the center line of the holds are located rectangular-section vertical flumes with gates at varying levels. These gates are operated by a system of levers from a substantial wood staging approximately at deck height. Two flexible pipes of 8 to 10 inches in diameter one on each side of the ship arranged so that the ends connected to the hull may be lowered or raised in especially constructed tracks on the side of the ship, are the means by which the fluid mixture of sand and water is pumped into the ship by way of the hoppers. It will be seen by this type of construction that a varied depth of bottom within limits may be reached. So much for the general features

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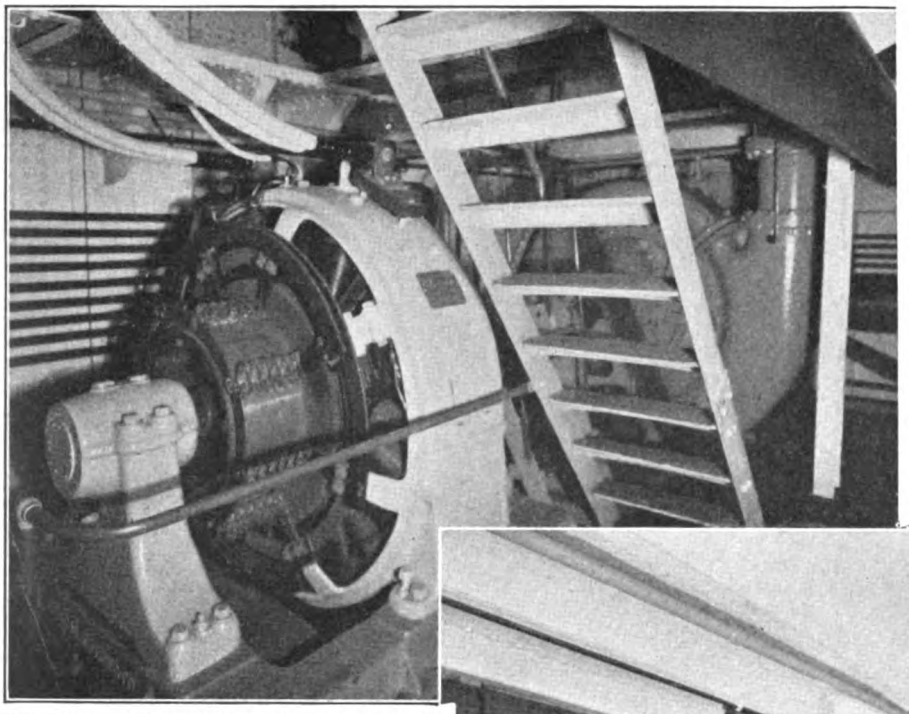
of the structural changes and additions.

The general scheme of the machinery is: Two diesel engines each of 600 horsepower, and each connected to main and auxiliary generators of 400 kilowatts and 50 kilowatts respectively. These main generating units are located in a fore and aft direction and toward the fore end of the machinery space. The current generated by these units is applied to two propelling motors of 500 horsepower each directly connected to propellers. To each side of the main diesel engine well to the forward end are located the two great centrifugal sand pumps. These pumps have an 18-inch discharge and are each driven by a 400-horsepower electric motor direct connected through a a flexible geared coupling. Aft of these sand pumps on either side of the ship are located two jetting pumps, driven by electric motors of 125 horsepower each. These pumps as the name indicates are used for providing the proper mixture of water when discharging the sand.



ENDVIEW, PORT SIDE SAND PUMP AND DRIVING MOTOR

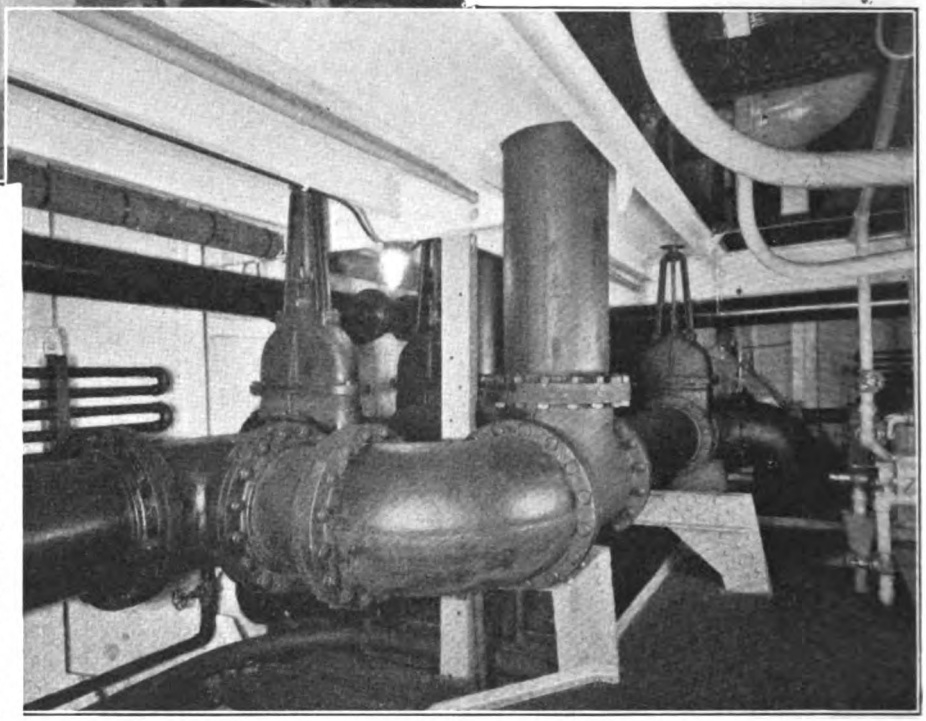
There is of course a great deal of auxiliary machinery on board in addition to what has been given above. But outstanding main mechanical features of the ship have been briefly touched upon. It will be seen that of the 1200 horsepower of the main engines practically the entire amount would be required to operate simultaneuosly the two sand pumps and the two jet pumps.

When so much power is required for auxiliary purposes and where electricity is found to be, as it generally is, the ideal medium for power for driving the auxiliaries, it can readily be seen that the strongest kind of argument exists for the installation of electric propelling motors as well.

The details of hull machinery and auxiliaries are grouped together in a special inset on page 16. The main diesel engines are of the 4-cycle, 6-cylinder type developing 600 brake horsepower each at 200 revolutions per minute and are of Worthington Pump & Machinery Corp. manufacture. The generators to which they are directly attached are of General Electric make, direct current, shunt wound, of 400 kilowatts each at 240 volts. There is an auxiliary generator mounted on a continuation of each main generator shaft of 50 kilowatts capacity. The auxiliary generators are used for auxiliary power as well as for excitation of the main generators, main propelling motors and sand pump motors.

Electrical Machinery

The main engines exhaust into two Davis Engineering Co., waste heat generators, (boilers) 3 feet in diameter and 12 feet high with auxiliary oil burners installed of Anthony type. When in operation the exhaust gases from the main engine pass through these generators. If for any reason no heat is desired at the boilers the gases may be by-passed to the silencers one for each engine of Worthington type. When the gases pass through the waste heat generators steam is made through the heat given off by these gases in passing through straight tubes going in at the furnace end and out through the top. It is really a type of fire tube boiler. The tubes are small and great in number. The maximum pressure allowable is 35 pounds of steam per square inch.



SUCTION AND BYPASS LINES TO SAND PUMPS ON THE M. S. SANDMASTER

The two main propelling motors of General Electric manufacture as is all the electrical equipment on this vessel, are of single armature direct current marine type each of 500 brake horsepower at 130 revolutions per minute and 240 volts. Each propelling motor is direct connected to a separate propeller shaft. The thrust is of the horseshoe type and the line shafting passes through the wing tanks the inboard sides of which form

(*Continued on Page* 42)

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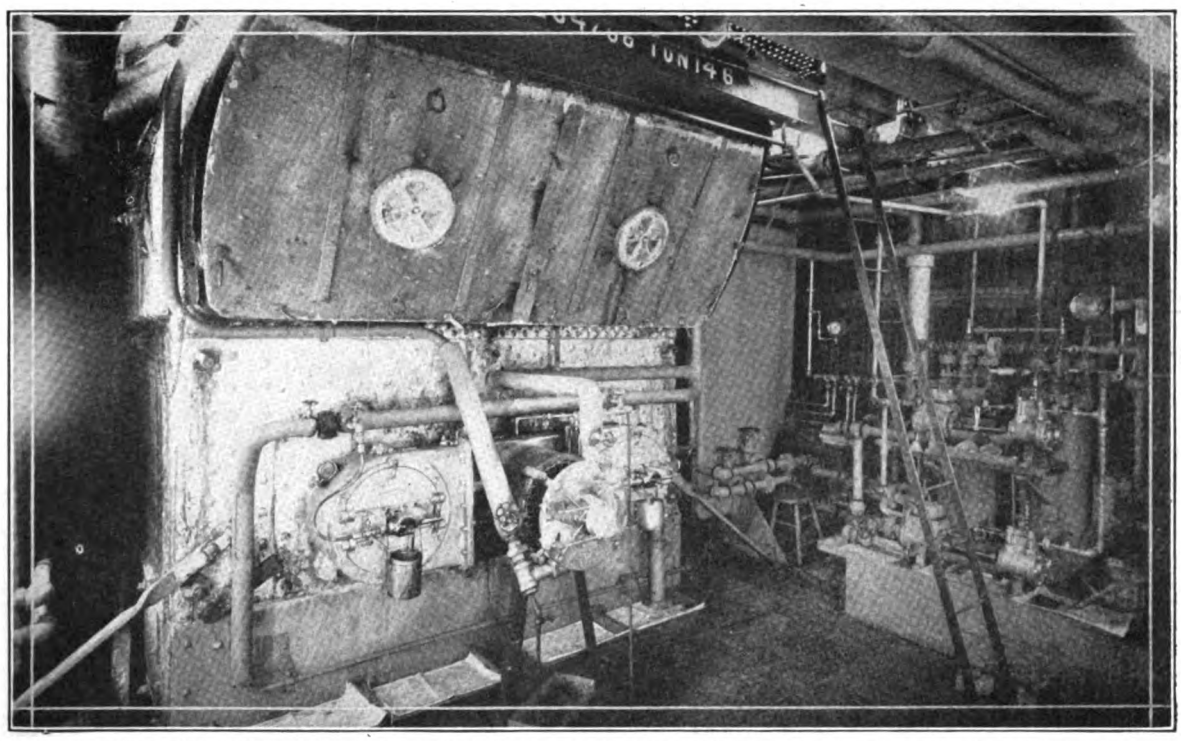
Harbor Fleet Cuts Fuel Costs By Burning Oil

BY G. S. CLARK



What an oil burning tugboat boiler room looks like—One of the fleet of tugs of the New York Central fitted with Todd oil burners

THE question of oil burning apparatus under a steam boiler is still under discussion. Although oil burners have been in general use for a number of years they apparently are still a novelty. Every time you mention to the "Old Timers" the desirability of oil fuel as compared with coal you get the same result as "When dutch meets dutch," in other words, there are a lot of people who want to be "shown."

The object of this article is to give a true picture of the result achieved from actual experience with both coal and oil fuel in a large fleet of harbor craft. The unit fittingly comparable is the pounds of fuel consumed per indicated horsepower per hour with proper weight given to loss of time due to fueling and the dumping of ashes and to a reduction in crew. The figures used are taken from records that are authentic and which have been kept with great care for comparison purposes, not for the justification of the use of fuels but for the distribution of charges for many other purposes.

The New York Central railroad prior to 1922 had all coal burning equipment. In the fall of that year a program calling for conversion of the fleet from coal to oil burning was inaugurated and ultimately every boat including ferries, tugs and steam lighters was equipped with oil burners. The work was carried out by the Todd Shipyards Corp. using the Todd oil burner. With the favorable results experienced in operating the converted craft, all doubt vanished as to the economical advisability of burning oil in all new vessels projected and specifications for such vessels called for oil as fuel. This fleet of boats is the source of the data for this comparison.

For the purpose of comparing fuel consumption the year 1922 has been taken for results obtained burning coal (that being the last year when coal was used) and the year 1925 for results with oil as fuel. Conditions pertaining to weather and ice in the rivers and the harbor of New York were similar and the cargo tonnage was comparable for these two years. It was therefore possible to make a fair comparison, one, if anything, in the surrounding conditions which might be said to slightly favor the coal burners.

Pea coal was used under these boilers and prices shown in the comparison are for that size of coal. It must be understood that with the use of No. 2 or No. 3 buckwheat, this comparison, as far as direct cost is concerned, would change but the complementary advantages such as ash removal, etc. would be in favor of fuel oil. Again as the heating qualities of buckwheat coal and pea coal are on the same par, the adjustment necessary would give results, which probably would not be very much out of line with the results obtained from pea coal. As these boats did not burn buckwheat, we can give no comparison that will have any tangible value.

At the outset it must be remembered that there is a great lack of fuel consumption uniformity between steam boats of the same design, with the same size engines and identical boiler horsepower. And there is also a difference between different kinds of boilers, for instance Scotch, Leg, etc. This is borne out by the results obtained with ferry

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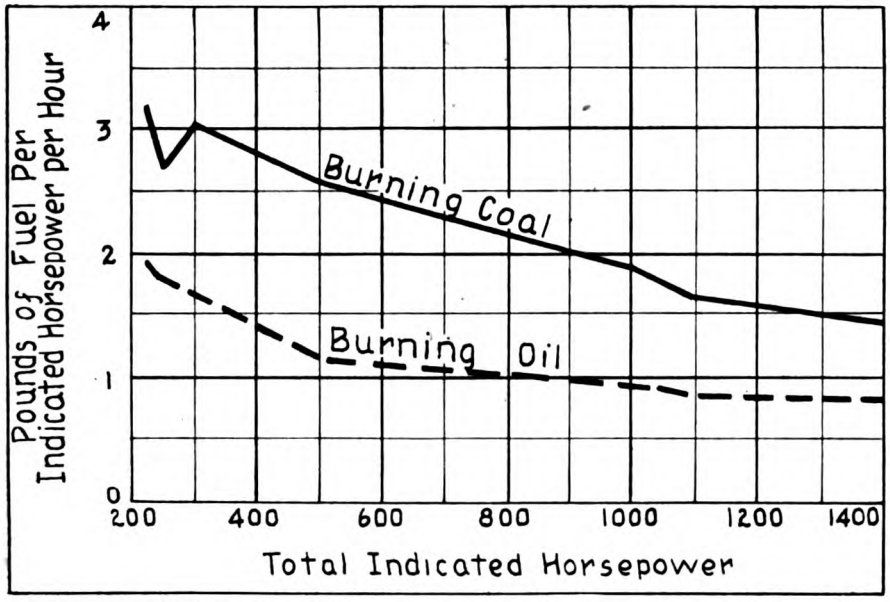


THIS CHART SHOWS THE AVERAGE FUEL CONSUMPTION PER INDICATED HORSEPOWER PER HOUR FOR THE ENTIRE FLEET OF HARBOR CRAFT FOR COAL AND OIL RESPECTIVELY AND THE VARIATION (DECREASE) IN UNIT CONSUMPTION CORRESPONDING TO INCREASED POWERS

boats, tugs and steam lighters. However, these "out of line" results are much more noticeable with coal than with fuel oil. The fluctuations probably are due to the lack of uniformity in the grade of coal burnt more than to any of the other attending causes.

The following table shows the comparison between the coal and fuel oil consumption experienced in the same boats:

Tug	Lbs. of Coal per H. P. Hour	Lbs. of Oil per H. P. Hour
A	2.69	1.30
B	2.51	1.30
C	2.33	1.16
D	2.51	1.32
E	2.37	1.27
F	2.78	1.42
G	2.82	1.40
H	2.64	1.41

In other words, the fluctuations with coal is 0.49 pound, whereas with fuel oil it is only 0.25 pound. The calorific fluctuations would be respectively 7350 and 4625. In other words, the heat delivering qualities of the fuel oil are more constant than those of coal.

From the above table it is possible to get a fair idea of the comparison of pounds of fuel used per indicated horsepower hour and the marked difference in hours carrying capacity of the boats shown, which means less frequent fueling for the oil burning boat. The average amount of coal consumed for the above eight boats expressed in pounds per indicated horsepower hour is 2.565 and in oil it is 1.322.

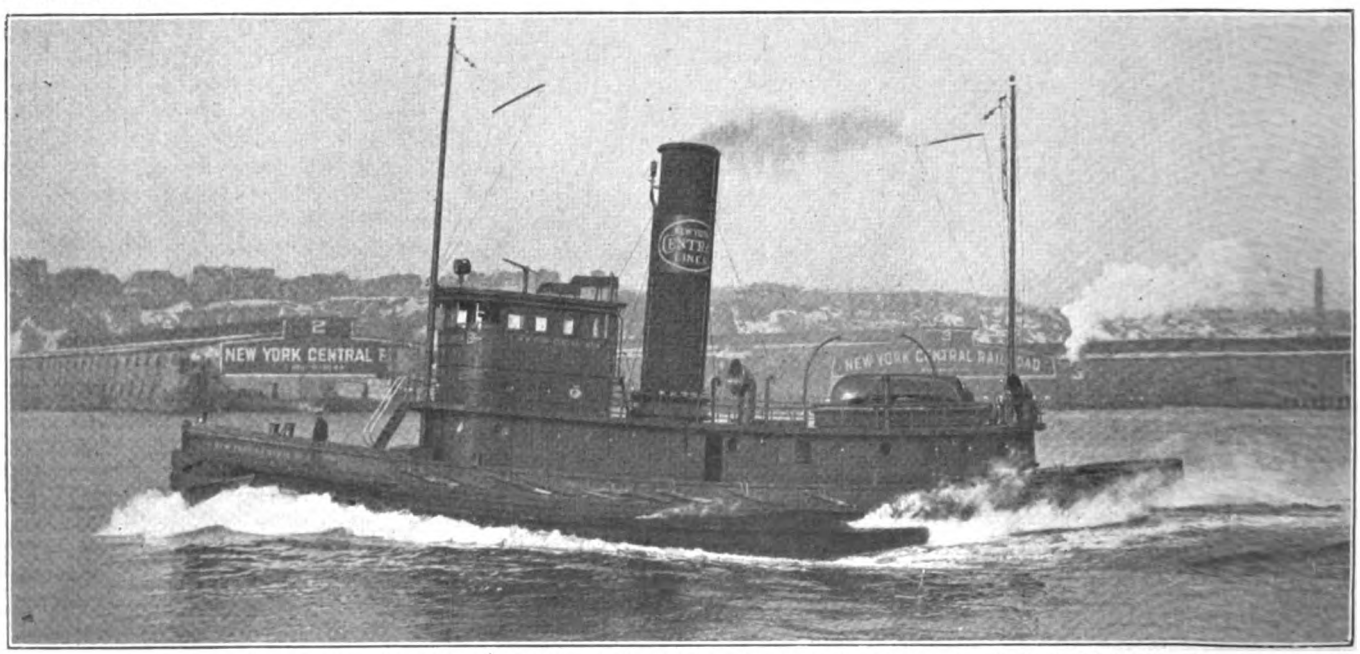
The relative difference prevails throughout the entire fleet of tug boats and steam lighters. Twenty-two tugs in 1922 showed a weighted average coal consumption of 2.50 pounds per indicated horsepower hour. The same fleet in 1925 showed a weighted average fuel oil consumption of 1.27 pounds per indicated horsepower hour. Using 15,000 b.t.u. for the coal and 18,500 b.t.u. for oil the calorific difference is 14.155 b.t.u. in favor of oil.

The time used in arriving at these fuel figures was actual operating time which by the way for many of the vessels is over 80 per cent of the total elapsed time, and the difference in calorific consumption is due to fuel saved by relief from the necessity of banked fires and unburned coal. These losses are liable to coal burning even with the best of care in firing, although under extreme educational measures it is possible that a slight change might be made in this calorific difference.

A very marked fact in the comparison of the fuel consumption is the increased efficiency using either fuel with increased horsepower and boiler capacity. A summary showing this condition follows:

Boat Indicated H. P.	Average Coal Consumption per I. H. P. Hour	Average Fuel Oil Consumption per I. H. P. Hour
225	3.24	1.92
250	2.65	1.79
300	3.04	1.72
500	2.58	1.32
1000	1.89	0.93
1100	1.65	0.86
1400	1.47	0.85

(*Continued on Page* 48)



NEW YORK CENTRAL NO. 19 IN THE NORTH RIVER—THIS IS ONE OF THE 22 TUGS OF THIS COMPANY ALL OF WHICH WERE CONVERTED FROM COAL TO OIL BURNERS

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Lake Shipping Men Pay Tribute *to Character and Achievements* of Harvey D. Goulder

NO MAN is more steeped in the traditions of the maritime affairs of the Great Lakes than Harvey D. Goulder, the internationally known admiralty lawyer. No man is more highly respected and beloved by the shipping fraternity, men and owners alike than he is. It was therefore not to be wondered at, after his retirement from active service as counsel for the Lake Carriers' association, that suitable recognition should be accorded him. On April 30 the shipping men of Cleveland, listed in the accompanying inset, combined in giving a testimonial to their honored friend and advisor. A. E. R. Schneider was chosen as spokesman and said: "Mr. Harvey D. Goulder, a number of your host of friends among those engaged in the operation of vessels upon the Great Lakes, and whose autographs are upon this parchment, have deemed it meet and fitting that they should present to you this testimonial of their high regard and sincere friendship, with the hope that when your eyes rest upon it you will have the thought of their friendship for you, earned and merited by your own acts and deeds in contributing to the welfare and prosperity of those living and dead who own and have owned vessels upon the Great Lakes, and also of those who man and have manned them. Could the dead speak they would speak as we speak, for they know that which we know—the much you have done for them, as we know the much you have done for us.

"We know that for more than a half century you have seen the commerce of the Great Lakes grow, tonnage increase, capacity enlarge and facilities improve, and this growth has needed that which you have given to vessel owners, sound advice after thoughtful consideration. You have known the dangers of nature's making to vessel and mariner and those incident to navigation, and you have unceasingly labored to lessen both. You have successfully endeavored to improve the waterways, and by your efforts have obtained government aids to navigation to better insure the safety of passage.

"You have applied your extensive knowledge of the merchant marine on the Great Lakes and eleswhere to its betterment, and your knowledge wisely applied to conditions when you thought circumstances demanded, is widely known to have been beneficial. You have been quick to discern what was for the best interests of vessel owner and mariner and have been prompt in devising ways to secure improved and better methods and means for the transportation of cargo and to reduce the hardships of mariners while increasing their efficiency. You have anticipated the needs of vessel owners and your knowledge of those needs has been used by you and them for the better protection of their property and the conservation of their interests. International relations promoting these interests have had your ever ready attention. You have been alert to laws inimicable to the business of vessel owners and the trade in which they were engaged, and far seeing of the consequences of unwise legislation and regulation and have always worked to avert them. To the end that the merchant marine upon the Great Lakes should be successful and profitable you have left nothing undone that ought to have been done and you have done all that could be done. You have labored mightily, you have accomplished mightily. We will not review your acts in behalf of the Lake Carriers' association, for they have been too numerous and too long continued for more than brief mention in this address. All of its members know your devotion to its interests and that which you have accomplished

Honor Harvey D. Goulder

Wm. G. Mather	Arthur C. Sullivan
Harry Coulby	Fred I. Kennedy
C. L. Hutchinson	Geo. A. Marr
J. S. Ashley	N. B. Nelson
A. T. Kinney	R. W. England
James L. Wallace	H. E. Gilpin
C. D. Dyer	Charles O. Jenkins
Peter Reiss	Fayette Brown
Henry Steinbrenner	Gordon B. Houseman
G. A. Tomlinson	A. W. Thomson
A. F. Harvey	Frank J. Sullivan
A. E. R. Schneider	Toledo Shipbuilding Co.
C. J. Peck	James E. McAlpine
F. A. Bailey	J. B. Rodgers
R. H. Pigott	John J. Boland
Walter M. Williams	Adam E. Cornelius
J. T. Kelly	James Carey Evans
Herbert K. Oakes	John J. Barlum
Carl D. Bradley	Ralph D. Mitchell
J. Burton Ayers	John T. Webster
J. S. Wood	A. G. Smith
W. H. McGean	H. N. Herriman
Edward J. Fleming	C. W. Bryson
Hugh F. Hughes	W. P. Schaufele
Frank E. Chamberlin	J. A. Paisley
	T. F. Newman

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will endure beyond the lives of its members. That which you have not done was impossible to do. To the furtherance of its purposes you have been faithful and zealous. To its succees you have wrought with strong will and steadfast purpose. To its success you have been wise in counsel and unflagging in duty. You have worked with us all and for us all. You have contributed not only to its successful maintenance but to the results of its operations in bringing benefits to owner and mariner, and you have earned the esteem, respect and friendship of all, not only for the doing, but for the courteous, efficient and fair manner of doing, and you have secured the confidence of its members, which has been deserved and exacted by your fair mindedness, fair dealing and integrity.

"Mr. Goulder, you have been our well-wisher and we are now yours, and to the many years of labor in our behalf, may be added many years during which you will have contentment, pleasure, and happiness, and may good health attend you and prosperity abide with you.

"We have the pleasure of presenting to you a token of our friendship, with the hope that you will believe it will continue during life."

Save 45 Per Cent in Operating Cost

Two Vessels of Same Size in Same Trade Compared

A NET saving of 45 per cent in the cost of carrying freight by one of the new Swedish motorships, as compared with a steamship of the same size and over the same route, has been calculated by Rolf Sorman, chief engineer of the Swedish Transatlantic Steamship Co. which owns and operates a fleet of 30 ocean going cargo vessels, of which eight are motorships and a ninth being built. In view of the fact that according to Lloyd's register one-half of all the new shipping now under construction in the world is to be run by motor, the table of relative costs of operation, as established from actual experience by the Swedish engineer, gains evident importance. In Sweden over eighty per cent of the tonnage now being built is to be motorized and more diesel engines are now under construction in Sweden than anywhere else.

For his detailed comparison, published in *Teknisk Tidskrift*, official organ of the Swedish Society of Technology, Engineer Sorman selected the motorship EKNAREN and the steamship ANTEN, both owned by the Swedish Transatlantic Co. and operated as freight carriers. In almost every particular, except the power of propulsion, the two vessels are identical and the internal combustion motor and the triple expansion steam engine are ordinarily run so as to develop about the same horsepower 2200.

Leaving aside the cost of construction, which now differs by only about 15 per cent, as well as depreciation and insurance, Mr. Sorman has found the cost of running the motorship at sea to be 944 kronor per day, while for the steamship the corresponding figure is 1272. These sums include the items of fuel, lubrication, deck and engine room supplies and wages. While the motorship crew gets higher pay, the reduced number more than makes up the difference, the two daily payrolls being 255 and 282 kronor respectively.

In port the daily expense of the motorship amounts to 459 kronor as compared with 558 for the steamer. Furthermore it costs more to get a steamship ready for departure, several tons of coal being required to get up steam. The refrigerator plant on the motorship, as well as the lighting system are more economical than on the steamer and the same is true of hoisting machinery. In fuel the motorship can provision itself for 120 days at sea, while the steamer must coal every 30 days, thus losing valuable time. In the matter of cargo space the motorship is also more economical.

On actual trips from Hamburg to Batavia with the two boats under similar conditions, Mr. Sorman has found that on the motorship the running cost amounted to 4.70 kronor per ton of cargo, while on the steamer it was 6.80 or a difference of 45 per cent. While an equally favorable showing for motorships cannot be guaranteed under all circumstances, the writer concludes that the prospects for the motorships are on the whole decidedly favorable. The chief source of uncertainty is the cost of fuel oil which is rapidly rising, on account of increased demand.

Reprinted from the May, 1926, issue of the *Swedish American Trade Journal*.

Order Two Bulk Freighters

PICKANDS MATHER & CO., Cleveland, managers for the Interlake Steamship Co., on May 19 ordered two bulk freighters from the American Ship Building Co. for 1927 delivery. These vessels will be, according to Charles E. Collins, fleet engineer, exact duplicates of the COL. JAMES PICKANDS and SAMUEL MATHER completed early this spring by the American Ship Building Co. Any changes will be of minor character.

A detailed listing of particulars for hull, main machinery and auxiliaries for the COL. JAMES PICKANDS was published in the the February 1926 number of MARINE REVIEW. The new vessels will be similar. They will be 600 feet in length over all, 580 feet in length between perpendiculars, 60 feet in molded beam, 32 feet in molded depth and 20 feet load draft in fresh water. Displacement to load draft will be 17,000 long tons.

The main machinery will consist of one triple expansion reciprocating steam engine to be built by the American Ship Building Co.; boilers will be of the water tube of Babcock & Wilcox make. The auxiliaries are to be similar to those for the PICKANDS. The cargo capacity will be about 11,500 long tons; and there will be eighteen hatches. It is estimated that about 10,000 tons of steel will be needed for the two. The vessels will be built at the Lorain plant of the American Ship Building Co. and will furnish work for a large number of men. No new building has been going on at Lorain since the completion of the previous Pickands and Mather boats.

It is quite generally understood that active negotiations have been under way for some time for two bulk freighters for the Pittsburgh Steamship Co. and also for a vessel similar to though larger, than the self-unloader T. W. ROBINSON.

Cox & Stevens, naval architects and marine engineers who have for the past 20 years maintained their offices in the downtown district have, as a result of the change in business conditions, decided to move up town to 341 Madison avenue, New York.

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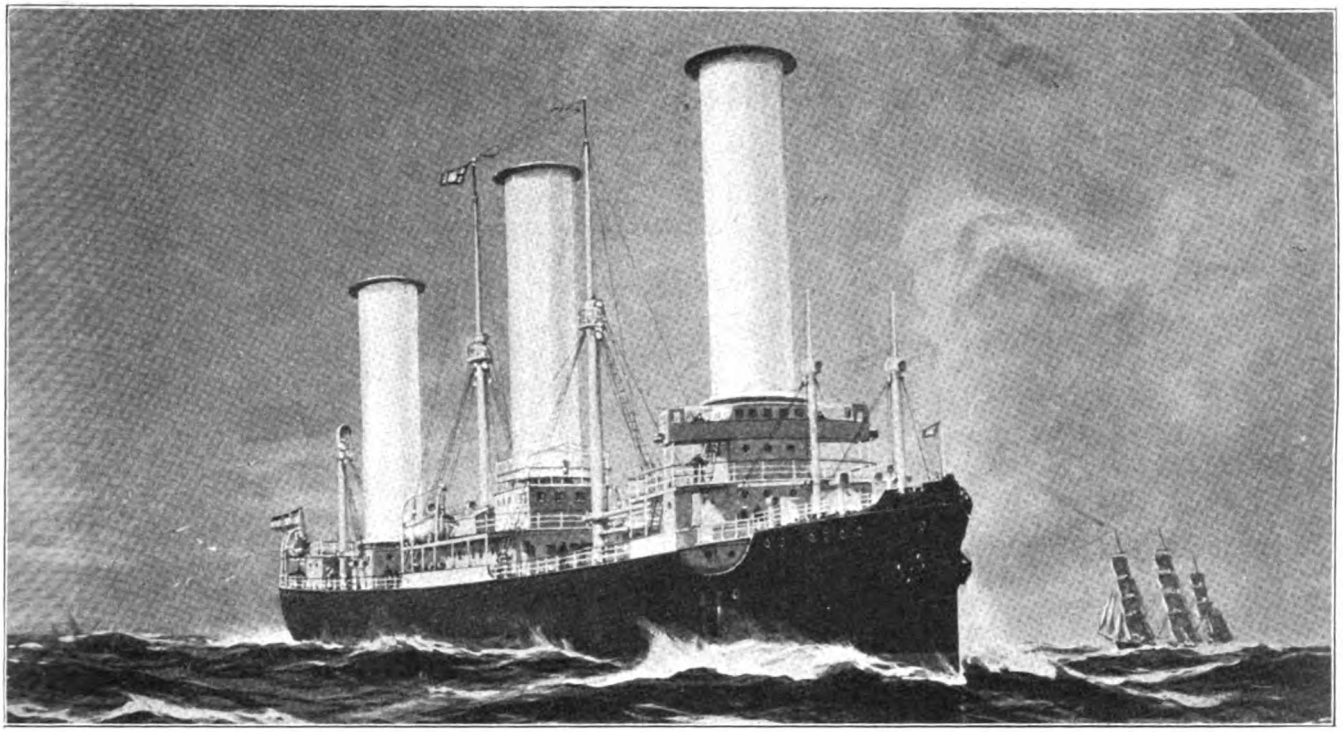

A reproduction of an artist's drawing of the new rotorship BARBARA launched at Bremen, Germany on April 28, 1926—This vessel of 3000 tons will be 300 feet long

Trials Prove Rotorship Claims

No Complete Analysis Yet Possible to Determine Ultimate Economy —Rotorship Now Building Should Furnish More Complete Data

PERHAPS no other development in mode of propulsion has aroused such widespread interest on the part of the public as well as those technically informed, as the rotorship invented by Anton Flettner of Germany. The BADEN-BADEN, formerly the BUCKAU, sailed from Hamburg on April 2 and reached the Canary Islands on April 12; sailed from there on April 13 and arrived in New York on May 9. This epoch-making trip of a small ship has demonstrated the feasibility of the added power taken from the wind by means of rotors. On May 13 Mr. Flettner, was a guest at the semi-monthly luncheon meeting of the Propeller club of New York. On the afternoon of that day a group of more than a hundred naval architects, engineers, business and financial leaders were invited on an inspection trial trip of the rotorship BADEN-BADEN. A 25-mile trip was made from the Battery in New York, the vessel using the rotors from the start. A fairly stiff southeast wind enabled her to proceed at good speed without the use of the engine. On the return trip the main engine was used. Mr. Flettner made the interesting observation that on her 4000-mile trip from Las Palmas to New York the BADEN-BADEN had only used 12 tons of fuel oil. On May 14 the rotorship again went out for an inspection trial trip in the harbor of New York. On this day there was very little wind and the vessel was compelled to make use of her main engine until after she had cleared the Narrows. After this for some period of time the rotors only were used, giving the vessel an estimated speed from 4 to 5 miles. This was with a very light breeze.

ANTON FLETTNER
Inventor of the Rotorship

What Flettner's Claims Are

At the luncheon on May 13 Mr. Flettner made the following remarks which are perhaps the best exposition of the claims and purposes of his notable invention:

"I think it will be of interest to you, if I first present to you a brief historical sketch of my various inventions.

"The current actuated free rudder is I presume known to you all. It has been installed on about 500 airplanes and about 100 ocean going and river vessels, mercantile as well as navy. I first conceived the idea of the rudder in connection with airplanes, and the first installations were on airplanes, where this

(*Continued on Page* 50)

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From the Old Log Book

Stray Items About the Great Lakes, Atlantic, Pacific and Gulf Coasts and Inland Rivers from MARINE REVIEW Files of 10, 20, 30 and 42 Years Ago

JUNE 1884

FROM the *Marine Record*, (then the name of MARINE REVIEW, and a weekly) for June 5, 1884, we find that the dome steamer METEOR which was built to cross the Atlantic in five days had been taken from Boston to Bath, Maine so that the Goss Marine Iron Works could make a try to place her engine in working condition.

It is not known what the word "dome" used above means nor what type of strange engine was to give such high speed. It is interesting, however, to note that even in that day the original of the Bath Iron Works had a particular reputation for engine work. Later, by two decades or so, the Bath Iron Works was famous for its fast torpedo boat destroyers.

* * *

IN AN editorial of that period arguments were advanced for the protection of the American shipbuilder by the continuation of the policy of not admitting foreign built ships to American registry without the payment of a duty.

* * *

SENATOR PEPPER of Pennsylvania has recently proposed a most interesting method of aiding our present day American shipbuilding. The senator's idea is, since the industries that make the steel and other materials which go into the building of ships are protected by duties imposed that the shipbuilder should be reimbursed to the extent of this duty when he builds a ship for American capital and American registry. It seems only fair that by this amount at least he should be placed on a parity with his European competitors.

JUNE 1896

IN 1896, the steel steamer, CORALIA, then recently built by the Globe Iron Works Co. was the largest vessel on the Great Lakes. She measured 432 feet overall, 412 feet keel, 48 feet in beam and 28 feet in depth. Her engine was a triple expansion steam reciprocating vertical type with cylinders 24 by 39 by 63 inches in diameter and with a stroke of 42 inches. There were four boilers in all 11 feet 9 inches in diameter by 10 feet in length.

* * *

AS A scene of complete destruction, the photographs taken of the wrecked engines of the steamer MERIDA *and published on page* 11 *of the June* 4, 1896 *number of* MARINE REVIEW, *can hardly be equalled, though the description of the accident stated that these photographs gave but a faint idea of the reality. Strangely no one was hurt.*

* * *

The accident occurred on May 26, 1896 when off Sand Beach, upbound, light, with the chief engineer James Balfour and the assistant on watch. The engine was making 80 revolutions per minute and everything apparently was moving smoothly, when suddenly a shock was felt and heard and the engine immediately commenced to race with lightning-like rapidity. Some submerged obstruction evidently came into contact with the propeller as drydocking later showed that nothing remained of the propeller but the hub. The sudden throwing off of the entire load and consequent racing proved too great a strain. The collapse was directly traced to the throwing of the counter balance on the after low pressure crank which broke out the side of the crank pit and carried away the guide column.

JUNE 1906

TWENTY years ago in MARINE REVIEW quite a complete illustrated description was given of the tug ORION, built by the Portland Co. for the Boston Tow Boat Co. The ORION was 102 feet in length overall by 19 feet 6 inches in beam and 11 feet 6 inches deep. A speed of 13½ knots was attained with the engine developing 581 horsepower. She was fitted with a vertical fore and aft compound engine with cylinders 15 by 32 inches in diameter with a 22-inch stroke. Steam was supplied from a Scotch boiler 11 feet 3 inches in diameter and 12 feet long. The keel and the stern post were of white oak, 10 x 10 inches. The stem was also of white oak, 10 x 14 inches. The frames were of white oak, molded, 10 inches and spaced 4-inch centers. The deck beams were hard pine, while the outside planking was of white oak 2½ inches thick with an Oregon pine deck 2¾ x 2¾ inches. The air and feed pumps were supplied by the Warren Steam Pump Co., while the 6-inch circulating pump with a 6 x 6-inch engine was supplied by the Morris Machine Works.

* * *

IT WOULD be very interesting to know how this particular tug has stood up in service these 20 years.

* * *

JUNE 1916

THE June, 1916, number of MARINE REVIEW gives a complete list of the German and Austrian merchant vessels and their gross tonnage, tied up in the various ports of the country due to the inability to get home on account of the watchfulness of the British fleet. There were at that time 65 German merchant ships of an aggregate tonnage of 488,368 tons laid up in American ports. Twelve vessels of 56,713 gross tons belonging to the Austrian merchant marine were also taking refuge here.

* * *

AN ACCOUNT is given ten years ago of the beginning of the Sun Shipbuilding Co., at Chester, Pa. At the time that this account was written the company had contracts for two tankers for the Sun Oil Co., and four more for other interests. This company is now known as the Sun Shipbuilding & Drydock Co., and has continued successfully in shipbuilding, engine building, drydocking and ship repairs.

* * *

SCARCITY of vessels and the seriousness of the ocean mail situation 10 years ago may be appreciated by the fact that at that time a Norwegian steamship Hermain, ore laden, arrived in Philadelphia from Rio de Janiero bringing 7 sacks of mail.

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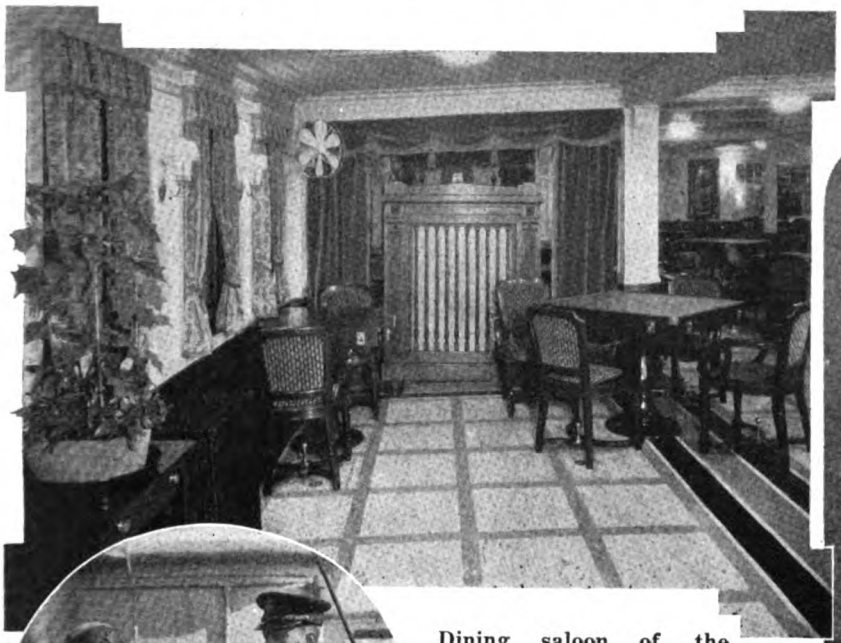
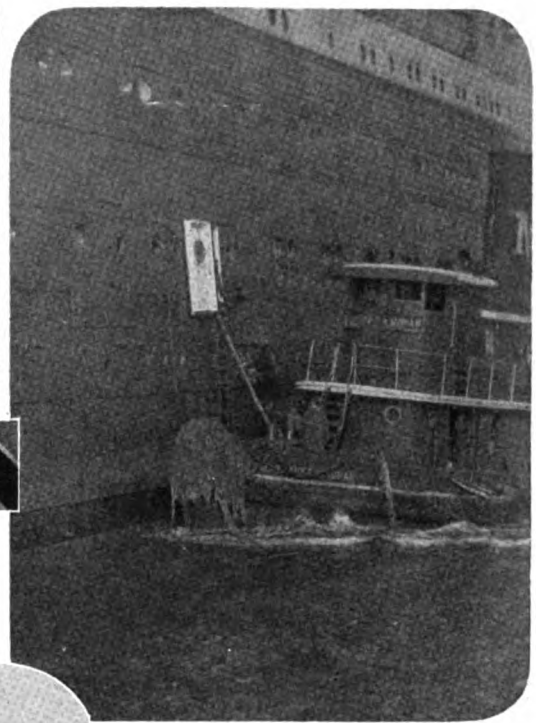
Latest Marine News in Pictures

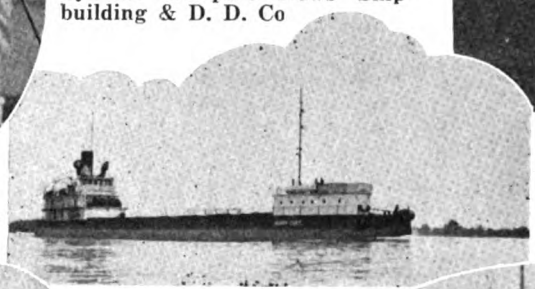


A number of belated passengers placed on board of the Leviathan down the harbor after the ship was overtaken by the tug Margaret A. Moran of the Moran Towing Co.



Miss Jessie E. Horsfall, editor Aero Digest, Miss Dorothy E. Price, and Commander Richard Byrd.

Dining saloon of the Coamo of the New York and Porto Rico Line. The Coamo was completed early this year by the Newport News Shipbuilding & D. D. Co

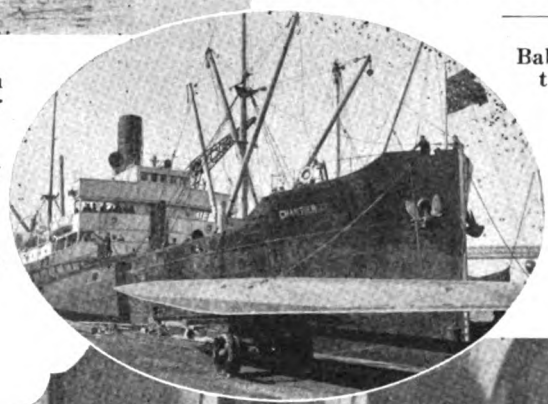


S. S. Chantier and wing of Fokker airplane. It was this ship that took Commander Byrd and his party to King's Bay. The commander arrived at the North Pole May 10.

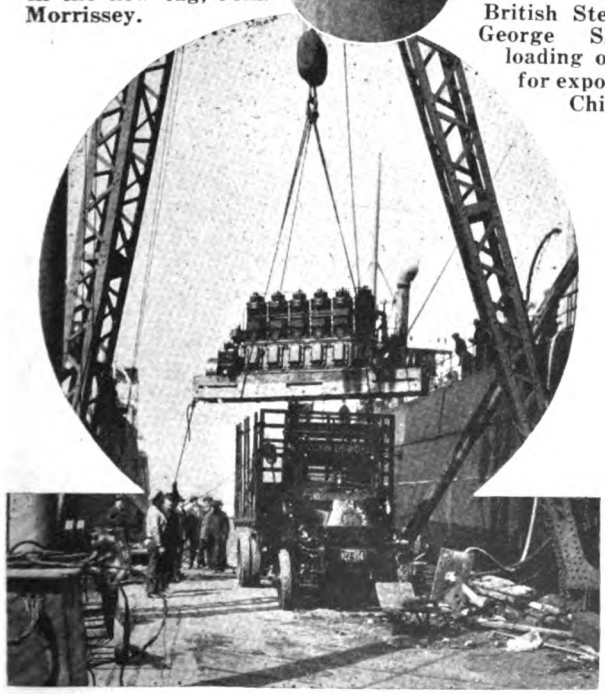
Morse Dry Dock installing diesel engine in the new tug, John Morrissey.

Whalebacker Henry Cort in the St. Clair river.

British Steamer George Shaw loading oats for export at Chicago.



Baby elephants transported from Europe to America in the hold of the S. S. Republic of the U. S. Lines.



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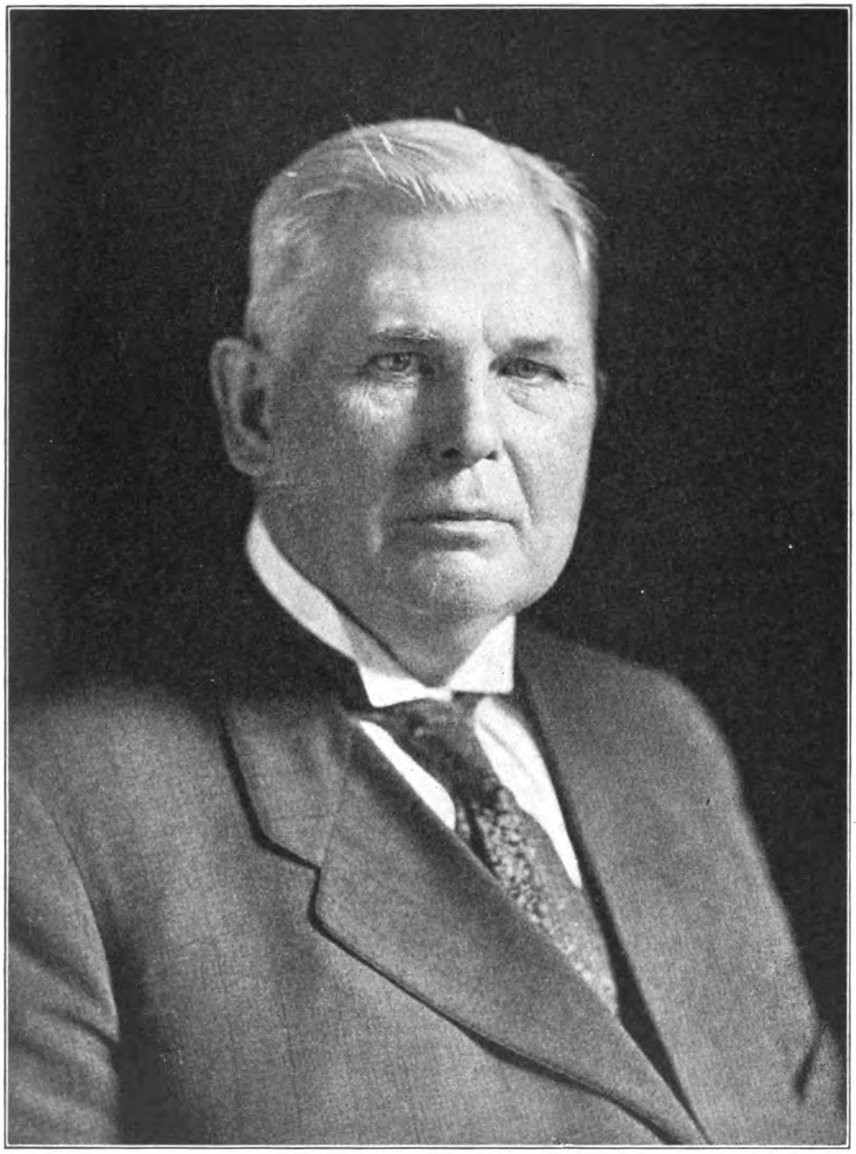
Stevenson Taylor

1848—1926

NO ONE, it is safe to say more truly represents the best traditions surrounding ship and engine building in the United States than Stevenson Taylor who died at an advanced age on May 19. He was the finest type of American gentleman in the best meaning of that phrase. He lived through a long interesting and



useful life. He spanned the period from the beginning of the modern development of naval architecture, marine engineering and shipbuilding, to the present day. Mr. Taylor served with distinction as president of the Society of Naval Architects and Marine Engineers. He conducted this office with the dignity and charm that one always associates with him. For many years he was at the head of the Quintard Iron Works at the foot of East Twelfth street, New York. This was one of the old shipyards of New York and in other years it was famous for its marine engines.

Several years ago Mr. Taylor was made president of the American Bureau of Shipping and under the influence of his direction, in spite of the depression in shipbuilding, this society now occupies a permanent and assured position in the shipping life of the country. Not long ago, due to poor health, on account of his great age, he retired from the presidency of the American Bureau of Shipping and was succeeded by the vice president of the society, Capt. Charles A. McAllister. Stevenson Taylor's name will take a high place among those who have served shipbuilding and shipping in the United States.

Ferry Boat Launched

In the May number of MARINE REVIEW an account is given of the launching of the ferry boat CAPE MAY on March 18 at the Harlan plant, Wilmington. The ferry boat PHILADELPHIA, a duplicate of the CAPE MAY, built for the Reading railway by the Bethlehem Shipbuilding Corp, at the Harlan plant, Wilmington, Del., was launched May 1, 1926. Mrs. W. Freeland Kendrick, wife of the mayor of Philadelphia, acted as sponsor. Before the launching C. W. Weaver, general manager of the Harland plant, was host at a luncheon at which Mayor Kendrick and Mayor Forest of Wilmington delivered brief addresses. The launching was entirely successful. All the dimensions and particulars of the PHILADELPHIA are identical with those given for the CAPE MAY on page 58 of the May number of MARINE REVIEW.

Ore Carrying Rate

The vessel carrying rates for Lake Superior iron ore and coal for the season of 1926 were decided upon in Cleveland on May 4 when the vessel chartering market opened formally. These initial charters were made on the same general rate bases which prevailed in the seasons of 1924 and 1925. Last year the fleet moved 54,000,000 tons of ore and expects to move several million tons more this season. The rates which opened the 1926 season are: 70 cents free per ton to Lake Erie ports from ports at the head of Lake Superior; 63 cents from Marquette and 52½ cents from Escanaba to Lake Erie ports, and 42 cents from Escanaba to Lake Michigan ports. The carrying charges for coal up the Lakes for the 1926 season were settled on May 3 at the same rates which prevailed for 1925. Contracts to move 10,000,000 tons of coal at these rates were placed.

Order Ships Abroad

The United States Gypsum Co. has placed a contract with the Furness Shipbuilding Co., Ltd. of England for two freighters, each to be 360 feet in length over all and of 6000 tons deadweight.

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Dock Management Progress Section

How Successful Dock Operators Have Met Problems of Giving Best Service to Ships

Ruins of the Poydras and Girod street wharves, New Orleans, destroyed by fire Nov. 17, 1925—View looking north taken at point near origin shows extent of fire which traveled 1300 feet before being stopped by the fire wall

Protect Wharves Against Fire

Adequate Protection of Piers Against Fire of Utmost Importance —Destruction of Wharves at New Orleans a Costly Lesson

BY WALTER K. GRANT

THE largest fire reported during the year 1925 occurred on the night of Nov. 17, when two public wharves and their adjacent structures at New Orleans were destroyed at a loss estimated at $4,000,000. The two large wharf sheds contained coffee, lard, alcohol, soap, lumber and miscellaneous cargoes, all valuable. Fourteen loaded freight cars were burned and one ship caught fire and was only saved from severe damage by being towed into midstream where its crew extinguished the fire.

The destroyed sheds, as shown in the accompanying diagram, were located on the east bank of the river and extended from the foot of Poydras street to Notre Dame street, a distance of approximately 1300 feet. There were no exposures of importance. The sheds were of the usual type of construction, one story high, with metal sides and ends, tar and gravel roofs on wood sheathing supported on unprotected steel purlins and trusses and unprotected steel columns. The floors of the sheds were mainly of wood. Where the sheds overhung the levee they were connected by an open wharf supported by the usual heavy creosoted timber and creosoted piling construction. They formed, with the open wooden wharf on the river side of the sheds, a continuous fire area without retarding walls or draft stops of any kind, either above or below the wharf deck. Fire protection facilities consisted of casks and pails spaced every 60 feet along the roadway through both sheds, auxiliary and master fire alarm boxes, hose houses, with good minor equipment, public hydrants near the sheds, a public fire department, a fire boat, watchmen of tenants and contractors, and harbor police patrol.

The open wharf between the Julia and Girod street sheds was undergoing reconstruction, and the decking had been removed. The lower end of the Julia street shed was undergoing remodelling to permit a switch track curve to be built on the wharf. There were two auxiliary boxes and one master fire alarm box in the Girod street shed. One auxiliary box was at the upper end, another was approximately in the middle of the shed mounted on a steel column alongside of the roadway, and the master box was mounted on the outside wall on the lower end of the same shed. None were made conspicuous by red lights, but were designated by signs in large letters. The sheds were lighted by electricity.

At the time of the fire, the river was at a stage that brought the water level about 16 feet below the outermost edge of the wharf and left about 10 feet of land on the river side of

(*Continued on Page* 58)

The author is connected with the Louisiana fire prevention bureau and is a member of the National Fire Protection association.

Great Lakes Red Book for 1926

The Great Lakes Red Book for the season of 1926, listing more than 1200 vessels of the Great Lakes, with the name of owner, captain and engineer of each vessel, was ready for distribution on May 10. This handy and convenient reference book also carries as in former years, a port directory.

In three definite respects the Great Lakes Red Book this year is an improvement over previous editions. More ships are listed than ever before. The owner and operator are separately designated to distinguish one from the other where they are in fact different. In order to be of greater usefulness there has been included a complete directory of shipbuilding and ship repair yards serving shipping on the Great Lakes. This section, which follows capacity of ore carriers, is twelve pages in length and gives the names of the leading officers as well as a description of shipbuilding and ship repair facilities for each yard.

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Clarify Shipping Board Status

Coolidge Believes Board Subject to Executive Direction—Sale to Dollar Opposed —Hearing on Pepper's Bill—Contracts Let for Diesel Installation

BY FRED B. PLETCHER
Washington Correspondent, Marine Review

ALL indications are that President Coolidge and other officials of the administration are preparing to press strongly in the next year for separation of the shipping board and the Emergency Fleet Corp., and for clarifying the present muddled attempts at authority on the part of the board over merchant fleet policies. Finding that congress has been unable to accomplish anything in a legislative way toward these aims of the administration at this session, the President without doubt will renew his recommendations at the next session.

The President within the last few weeks has informed members of congress who have conferred with him that he is extremely desirous of bringing about a reorganization of the board. The idea of the administration is that the shipping board should be completely reorganized, with its control under the President.

President Should Have Authority

The present unyielding stand of the shipping board, embodied in its "declaration of independence" some time ago, which holds the board responsible to no one except congress, is not in accord with the administration's views. The President believes that he should outline the board's policies, particularly with respect to disposing of the merchant fleet.

Late last month, President Coolidge decided to name a successor to Bert E. Haney, of Portland, Oreg., on the shipping board so that the senate would have a chance to confirm the appointment before adjournment. While the President has picked a man who will be more responsive to the President's suggestions than Commissioner Haney was, it is recognized that actual shipping board reform, from the point of view of obtaining a more efficient working body, still is a long way off. The President merely is biding his time until the time comes when congress, in response to a growing public sentiment, may see fit to strip the shipping board of its present ultra-independence. The President feels that congress should have clarified the question of who has authority over the shipping board and whether the board is its own sole administrator, responsible to no one.

President Elmer E. Crowley, of the Fleet corporation, having failed to indorse the sale of the five President-type vessels of the American Oriental Mail line to the Dollar interests, intended to resign, according to rumors. Administrative affairs in the shipping board and Fleet corporation promise to be in a stew this summer, the President practically having been informed by the board to keep hands off. In response to the resolution of Senator McNary, of Oregon, the senate commerce committee spent more than a week in conducting hearings on the American Oriental line sale, after which a resolution was prepared by Senator Jones, chairman of the committee. In the meantime a suit for injunction to halt the sale was started in the District of Columbia supreme court by the Seattle and Portland interests, which opposed the sale of the five ships to the Dollar line on the latter's bid of $4,500,000, claiming that the sale should be re-advertised in view of the bid of $4,600,000 submitted by the Seattle and Portland interests later, and which was not considered by the board.

Considerable opposition to this sale has been manifested by other than the Pacific-Northwest interests. Some of this opposition bases itself upon the view that the Dollar interests will have a monopoly of the passenger service from the Pacific ports to the Orient. Other substantial opposition is based on the grounds of insufficient assurance of continued operation of the ships on the established trade route.

Limit Government Aid to Essentials

The national referendum completed early last month by the United States chamber of commerce on merchant marine questions showed overwhelming support for complete reorganization of the American merchant fleet. The question of ship subsidy, also having been voted on, revealed support by about 15 to 1 of the principle of limiting government aid to the maintenance of essential trade routes and the development of higher types of ocean service. Trade associations and chambers of commerce in 45 states, the District of Columbia, Hawaii and Mexico took part in the vote. The referendum favored the cutting down of the personnel of the shipping board, the organization of a federal shipping council, with regional port representation, to determine national shipping policy, and the transfer of all

(*Continued on Page* 58)

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Equipment Used Afloat, Ashore

Wood Working Machine for Shipyard, Dock or on Board Ship—Performs Many Operations—World's Largest Coal Dumper — Efficient Lubricant for Marine Use

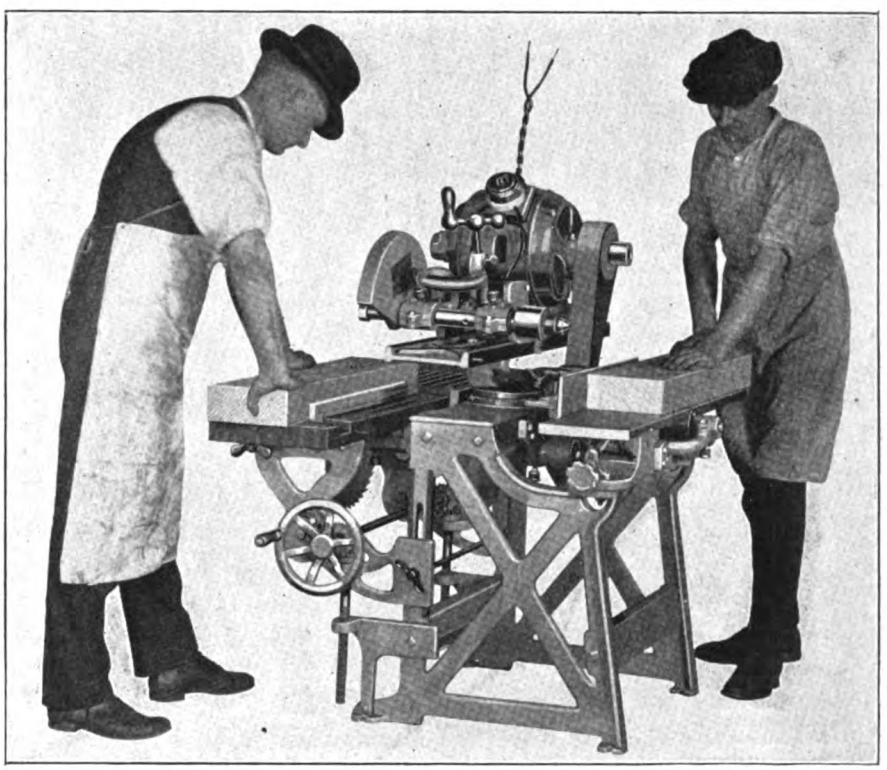
FOR versatility in application, the electrically driven woodworking machine, shown in the accompanying illustrations, is quite remarkable. With this machine, cross cutting, ripping, jointing, boring, sanding, dadoing, planing, plowing, mitering, rabbetting, molding, mortising and grinding can all be carried out with speed and efficiency. The machine is supported on a built up frame and is driven by a motor with belt and a shaft. There is a buss planer platen on one side and a ripsaw platen on the other. Saws are fitted on two separate shafts for cross cutting and for ripping.

The machine is comparatively light and can be shifted around. There are three different sizes, the largest size weighing 1600 pounds, and is driven by a 5-horsepower motor. The capacity of this machine is 8-inch cross cutting and 6-inch ripping. The length of the machine complete is 5 feet, the width 4½ feet and the height 6 feet. The second size of machine weighs 700 pounds and can be taken down in four parts. It is driven by a 2-horsepower motor of a special type that will develop 4½-horsepower on 220 volts. The capacity of this size is for 4-inch cross cutting and 4-inch ripping. The length of this size is 5 feet, the width 2 feet 6 inches, (by folding table brackets). The third and smallest size, without jointer, weighs 295 pounds. A 6-inch jointer 42 inches long will add 100 pounds to this weight. The whole machine can be taken down into three parts of 132 pounds each. The capacity of this machine is 3-inch cross cutting and ripping.

It is 44 inches long, 33 inches wide and 47 inches high. This little machine is guaranteed by the manufacturers to cut 2-inch stock at the rate of 30 lineal feet per minute on a 110-volt circuit.

A machine of this character would undoubtedly prove very useful as a very complete tool for the carpenter shop of the larger passenger ships. The skilled mechanic on board of such a ship could then carry out many necessary repairs and alterations now requiring shore help. Almost every dock and pier has a carpenter attached to its staff and he is generally provided with a shop and tools on an upper deck at one end. This tool would be particularly useful for such a small shop.

This machine is manufactured by the Master Woodworker Mfg. Co., 612 Brush street, Detroit. It is a combination of power and actual portability. The smallest model can be taken to the job and will handle work at a good speed. A special motor is fitted and it can be connected to an ordinary lighting circuit.



GENERAL VIEW OF THE WOODWORKING MACHINE DESCRIBED IN THIS ARTICLE —RIPPING AND JOINTING AT THE SAME TIME—RIP SAW AND JOINTER CAN BE RUN TOGETHER OR SEPARATELY

All the operations of the machine are done on three mandrels, the underslung grip saw mandrel, the underslung jointer and the overhead cross cut mandrel. One of the important features of the machine is the overhead traveling saw. The saw travels on the slide, the carriage being mounted on ball bearings and is therefore free from vibration. The slide overhangs the cutting table which assures absolute stability of the carriage at any swing and it will cut the same depth to the finish.

By the application of the overhead slide principal the saw cuts its way through the lumber and there is no binding, cuts are square and power is saved. The projecting slide is used as a gage and the graduated dial gives the correct angle of the slide over the cutting table. This angle can be changed at any time while running.

A suitable electric motor is connected direct to the mandrels so that there is no power lost in complicated transmissions and there are no cross belts. All mandrels are equipped with left-hand threads so that the saws and other tools cannot get loose. Both slide and motor revolve on a pivot kept in position by a special locking device, on a graduated dial. In this way all settings for miters or angles of any degree are all absolutely correct.

Adjustment in a vertical direction is possible with the overhead mandrel and the machine may be set to any angle for operation and locked in place. A guard protects the over-

(*Continued on Page* 56)

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Marine Business Statistics Condensed

Record of Traffic at Principal American Ports for Past Year

New York

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
April, 1926	483	1,967,964	538	2,248,081
March	523	2,090,347	511	2,033,938
February	404	1,591,273	454	1,826,886
January	407	1,671,761	463	1,883,094
December	431	1,706,900	510	2,022,775
November	473	1,902,745	488	1,886,587
October	450	1,920,797	530	2,229,801
September	449	1,960,366	505	2,117,563
August	469	1,889,239	493	1,933,228
July, 1925	457	1,813,338	547	2,130,581

Philadelphia

(Including Chester, Wilmington and the whole Philadelphia port district)

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
April, 1926	80	185,401	61	135,919
March	107	264,754	72	158,858
February	78	184,715	52	113,763
January	76	206,081	52	136,040
December	83	194,283	53	142,885
November	83	216,604	44	116,468
October	74	193,534	49	128,906
September	85	211,019	51	113,257
August	84	197,743	65	146,144
July, 1925	96	241,244	57	131,400

Boston

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
April, 1926	101	285,245	77	210,542
March	117	356,432	62	173,217
February	92	263,475	42	136,618
January	97	287,335	55	156,167
December	96	270,869	67	210,652
November	115	341,258	59	147,554
October	105	312,455	73	206,347
September	114	328,275	78	196,632
August	136	349,514	104	246,275
July, 1925	140	336,982	115	283,558

Portland, Me.

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
April, 1926	23	48,836	32	73,947
March	34	97,413	31	88,462
February	23	64,150	23	66,660
January	26	78,508	27	81,917
December	31	85,651	29	75,072
November	25	35,616	23	33,194
October	17	27,630	20	34,668
September	19	36,082	22	45,258
August	16	37,391	17	36,191
July, 1925	23	48,916	23	54,903

Providence

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
March, 1926	15	47,557	8	34,025
February	8	29,622	7	30,033
January	5	20,355	6	24,221
December	16	52,660	6	27,149
November	6	16,446	8	26,811
October	9	35,405	6	21,232
September	7	21,260	7	22,410
August	3	14,019	5	17,041
July	12	34,835	9	27,767
June, 1925	8	34,034	7	28,575

Portland, Oreg.

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
April, 1926	17	66,789	29	107,892
March	21	85,073	38	134,432
February	23	81,440	33	114,147
January	22	84,722	26	97,068
December	23	86,443	40	144,392
November	28	108,796	37	140,784
October	26	98,371	41	144,397
September	28	103,812	43	158,098
August	16	62,202	23	81,712
July, 1925	15	56,181	23	79,132

Baltimore

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
April, 1926	107	330,401	110	326,649
March	120	382,983	119	362,256
February	102	304,714	99	288,640
January	97	302,341	88	264,249
December	105	314,958	109	332,721
November	106	334,997	99	312,705
October	99	302,522	92	293,425
September	93	264,455	109	310,029
August	109	319,469	104	319,035
July, 1925	115	345,191	123	350,375

Norfolk and Newport News

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
April, 1926	21	45,875	126	305,549
March	22	40,160	140	395,033
February	20	48,377	108	298,756
January	26	69,958	96	256,019
December	24	57,907	100	279,570
November	27	78,573	81	254,439
October	26	51,328	91	248,017
September	39	94,940	85	237,623
August	70	183,064	122	348,475
July, 1925	61	163,764	131	347,756

Savannah

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
March, 1926	43	102,126	41	99,244
February	40	97,908	46	121,792
January	38	103,029	38	106,472
December	37	101,726	35	91,141
November	37	112,158	38	117,064
October	45	125,766	47	126,452
September	50	137,030	39	103,408
August	34	77,027	39	87,455
July	38	97,332	34	91,981
June, 1925	26	60,788	27	60,924

Key West

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
April, 1926	88	101,331	88	99,227
March	102	117,292	90	114,917
February	70	85,607	69	88,229
January	80	110,684	81	110,084
December	89	121,193	88	113,996
November	96	113,222	89	107,091
October	77	91,125	75	90,953
September	76	96,356	73	91,119
August	72	90,106	70	87,924
July, 1925	77	94,002	76	91,264

Mobile

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
April, 1926	109	205,035	98	178,025
March	125	228,481	115	221,022
February	100	153,884	92	188,057
January	109	212,005	78	150,384
December	104	183,941	89	173,371
November	101	191,490	95	185,722
October	88	258,529	84	161,648
September	80	149,289	76	171,432
August	83	172,872	75	152,613
July, 1925	89	180,488	80	160,739

Seattle

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
March, 1926	38	166,536	45	184,067
February	42	168,308	45	182,920
January	45	182,889	50	204,058
December	47	201,460	55	231,787
November	47	199,055	46	196,343
October	52	203,951	49	207,153
September	42	173,157	43	183,917
August	31	135,105	35	144,874
July	32	137,319	28	130,875
June, 1925	34	143,655	41	174,668

New Orleans

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
April, 1926	258	626,277	296	694,673
March	295	754,863	300	751,054
February	255	717,048	250	691,747
January	241	659,776	243	652,209
December	273	750,625	279	764,022
November	261	645,709	232	629,728
October	252	729,058	276	789,419
September	248	655,367	248	680,446
August	257	675,405	253	664,064
July, 1925	265	673,711	262	648,474

Charleston

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net. tonnage	—Clearances— No. ships	Net tonnage
March, 1926	18	64,432	20	49,897
February	10	35,629	10	21,945
January	8	27,610	18	27,237
December	14	38,441	10	26,597
November	17	50,093	13	31,111
October	22	68,795	21	55,903
September	13	25,853	22	47,838
August	19	34,089	16	43,588
July	14	30,247	17	39,780
June, 1925	12	23,203	16	49,499

Galveston

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
February, 1926	39	89,426	71	208,388
January	36	92,194	75	235,699
December	38	83,590	97	300,872
November	34	107,440	83	266,458
October	43	98,168	96	302,581
September	33	95,954	72	225,194
August	28	80,524	41	133,058
July	36	100,359	52	141,316
June	47	120,423	57	177,647
May, 1925	46	114,702	53	151,098

Los Angeles

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
April, 1926	149	434,866	130	370,158
March	139	371,793	128	305,105
February	119	363,875	111	306,161
January	130	381,785	115	335,041
December	149	392,707	109	310,852
November	181	398,459	123	337,483
October	261	365,552	183	268,611
September	115	284,493	205	259,437
August	161	344,646	160	295,220
July, 1925	133	326,692	119	285,624

San Francisco

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
April, 1926	155	583,821	167	602,680
March	144	571,040	135	511,010
February	133	506,778	134	506,317
January	154	544,882	139	528,315
December	135	532,691	153	593,556
November	124	491,579	142	547,770
October	138	517,798	136	511,844
September	135	487,872	144	535,301
August	154	579,197	154	549,844
July, 1925	138	517,798	136	511,844

Port Arthur

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
February, 1926	21	65,930	32	70,814
January	23	75,232	32	108,118
December	31	86,254	24	71,883
November	40	117,506	42	120,597
October	30	86,652	32	95,695
September	26	101,387	31	88,654
August	22	66,176	23	68,827
July	27	59,956	34	100,395
June	26	67,251	30	83,972
May, 1925	28	105,707	42	122,871

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Columbian *Tape-Marked* Pure Manila Rope has built its enviable reputation on its ability to give the expected amount of service —and then give more. It is a fact that constant users expect more service from Columbian, and they get it. There are two reasons for this extra margin of wear:

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River Traffic Grows

(*Continued from Page* 13)

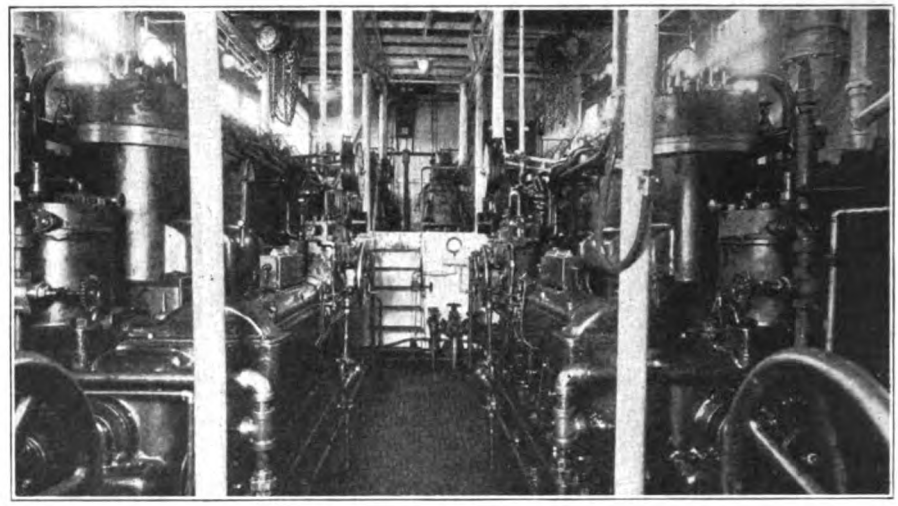
private contractors working under the direction of United States army engineers has brought out this spring a vastly increased number of prospective owners and operators of river towboats and barges. Strenuous efforts of the large iron and steel mills that line the banks of the Ohio from Pittsburgh to Louisville, Ky., to reduce their transportation costs, due to present keen market competition, has led them into the building of their own tugs and barges.

It also has brought about the expenditure of millions of dollars in the construction of suitable terminals right at the plants in the Pittsburgh, Wheeling, Louisville and other districts.

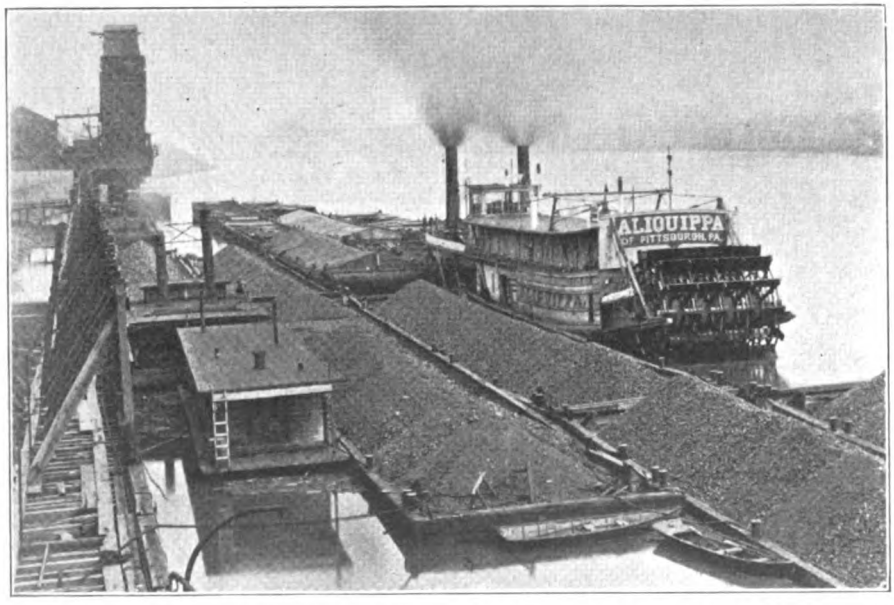
A flood of inquiries from various Ohio and Mississippi river shippers has come out this spring for various types of barges and river steamers. The various shipyards of the country as of March 1 were reported by the government bureau of navigation as building or having under contract a total of 227 steel vessels of 235,464 gross tons. Of this total, 140 vessels including towboats, barges, oil barges, etc., of an aggregate 56,586 gross tons, were being built for this river traffic solely.

Traffic Shows Rapid Growth

The Ohio river, with its lock and dam system as yet only partly completed, carried in 1925 in the Pittsburgh district 15,787,015 tons of various commodities, compared with 10,866,638 tons in 1924. The increase of 50 per cent in one year is attributed to increased shipments of coal, coke, steel products and oil. The steel mills thickly scattered along the Ohio river are making larger shipments by water each succeeding year since the Jones & Laughlin Steel Co. four years ago first set the pace. These shipments of bulk freight are going to Gulf ports for export and into the oil fields of the Southwest, being trans-shipped to the railroads in part at Memphis, Tenn., where formerly the transfer to the railroads had been made temporarily at Louisville. The mills figure a saving of $2 a ton on such shipments of steel products, compared with a straight haul by the railroads to destination. A saving of $1 a ton by river haul of 200 miles on coal from West Virginia mines has located at Cincinnati a $30,000,000 superpower electrical station, and several others are planned further up the river. The volume of commerce moved over the Ohio river, exclusive of its tributaries, in 1924 was transported at a saving conservatively estimated by shippers at $2,200,000 in freight charges measured against present railroad rates. This sum is 60 per cent of the estimated annual cost of river maintenance.



ENGINE ROOM OF THE MODERN RIVER TOWBOAT GEO. T. PRICE—VIEW LOOKING FORWARD SHOWING TWO FAIRBANKS-MORSE DIESEL ENGINES EACH OF 360 HORSEPOWER AT 250 REVOLUTIONS PER MINUTE



RIVER STEAM TOWBOAT ALIQUIPPA OF THE VESTA COAL CO., A SUBSIDIARY OF JONES & LAUGHLIN, DELIVERING A LARGE TOW OF MONONGAHELA RIVER COAL TO THE STEEL PLANT AT WOODLAWN ON THE OHIO RIVER BELOW PITTSBURGH—COVERED BARGES ARE FOR FURTHER SHIPMENT OF FINISHED PRODUCTS DOWN RIVER

Forty years ago a band of courageous Cincinnati and Pittsburgh business men conceived the plan of persuading congress to do something for the Ohio river that would make it available for general transportation. Shallow-draft steamers and flatboats could navigate it in the spring and fall but in the summer months it was almost dry. Congress appropriated a little money under pressure and the Davis Island dam was built at Pittsburgh, using the Chanoine wicket. This was the first application of the movable dam conception of the French engineer to an important river, the practical application being made by Colonel Merrill and Colonel Craighill, of the United States engineer corps after close study of the Chanoine wicket in France. After the Davis Island dam had been completed, nothing was done for twenty years.

Will Have A 9-Foot Depth

Then congress ordered work resumed on five more dams under a plan that called for a 6-foot stage of water in the Ohio. Under the successful maneuvering of Major W. L. Sibert, assigned to build those five dams immediately below the Davis Island dam, congress was presuaded

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Bethlehem (Dahl) Mechanical Oil Burning System

Insures Economy of Space Economy of Operation Economy of Labor

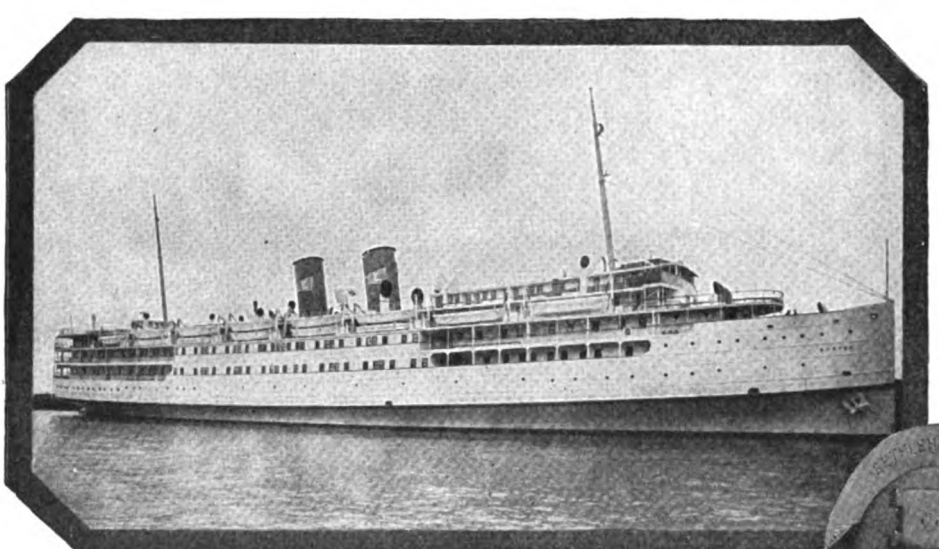
ECONOMY is the chief factor responsible for the large number of installations of the Bethlehem (Dahl) Mechanical Oil Burning System.

The use of the Bethlehem (Dahl) Mechanical Oil Burning System for the burning of fuel oil instead of coal on board a vessel, permits larger cargoes to be carried for an equal steaming radius, or a larger supply of fuel to be carried with a resulting increase in steaming radius.

Other advantages accruing from the burning of oil under steam boilers are:—the complete elimination of dirt incidental to handling coal and ashes; a steady steam pressure in the boiler because the furnace temperature can be kept at a more even heat since there are no sudden changes of temperature due to cleaning fires.

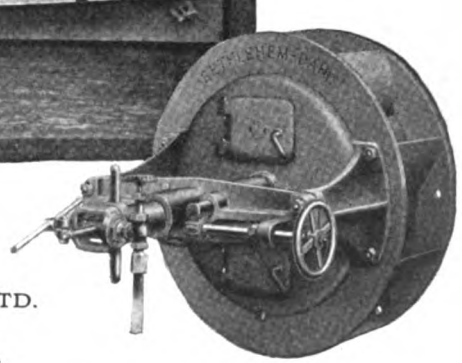
Due to the fact that all dust and dirt attendant to coaling are eliminated, and there is no soot or smoke, the Bethlehem (Dahl) Oil Burning System can be equally well applied to Passenger vessels and to Freighters.

Let our engineers confer with and explain to you how easily you can reduce your fuel costs and increase your cargo capacity and profits by the installation of the Bethlehem (Dahl) Oil Burning System.
Their experience is at your disposal.
Write for an appointment; they will be glad to accommodate you.



S. S. Boston

This coastwise passenger and freight vessel, operated by the Eastern Steamship Company between New York and Boston, is equipped with the Bethlehem (Dahl) Mechanical Oil Burning System.



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to change its mind and undertake a 9-foot river depth project. It was a narrow escape from damming the Ohio with a 6-foot minimum depth for many years. Finally an engineering board was ordered to survey the entire Ohio river and formulate a project for its entire canalization. This was done and, with congressional appropriations being made annually, the work has progressed until it is within measurable distance of accomplishment. The dedication of the last three dams and locks on the stretch of river between Pittsburgh and Louisville was accomplished last October in the presence of the Ohio Valley Improvement association, which has fought all these years for Ohio river improvement.

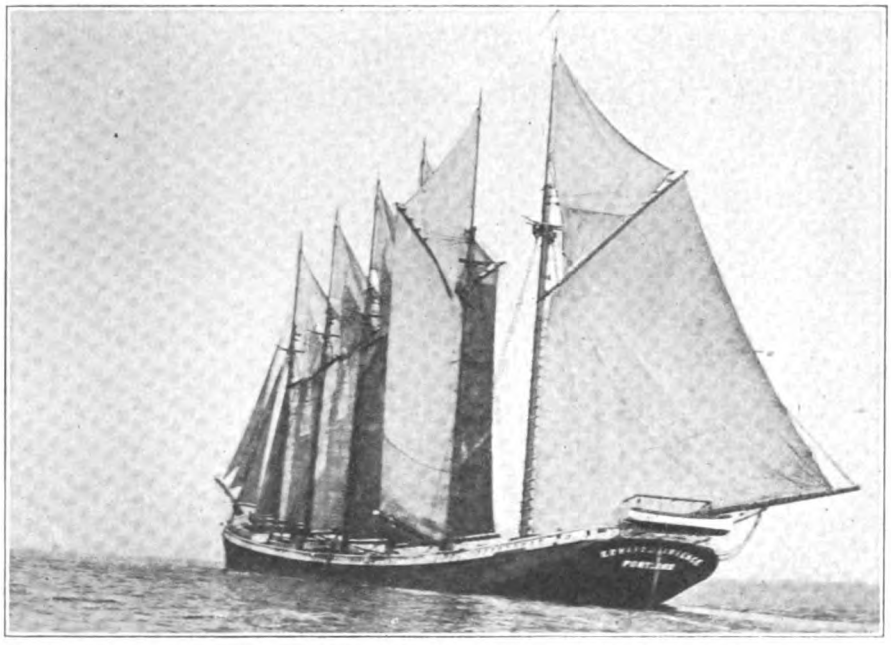
This Ohio river project is only a part of a vaster Mississippi valley river improvement program. This larger project involves improvement of the Mississippi river from New Orleans to Minneapolis-St. Paul, together with various tributaries. For instance, it means an 8-foot minimum channel up the Mississippi from Cairo to St. Louis, thence up the Missouri river to Kansas City; and a 6-foot channel up the rest of the Mississippi to the Minnesota cities. Upon this larger Mississippi river program the government has expended $200,000,000 and must spend $75,000,000 additional before it is completed.

This means that Pittsburgh and southern Ohio iron and steel as well as Kentucky and West Virginia, Ohio and Pennsylvania coal, will be carried cheaply by water into the mouth of the Mississippi river for export abroad, as now is being done. Also into the Southwest oil fields. Also into the farther West through the 29 railroads that center at St. Louis and Kansas City. And finally into the far Northwest through distribution at St. Paul and Minneapolis. So trade and transportation improve.

A Famous 6-Master Burns at Anchor

BY W. R. McDOWELL

THE last surviving craft of the six-masted schooners, the EDWARD J. LAWRENCE, came to the end of her career by burning to ashes on Dec. 27, 1925 while laying at anchor in Portland Harbor, Maine. For the last three years she has been waiting idly in the above mentioned port, unable to procure a cargo these modern times at a rate that would pay her to operate. In recent years the big six-master sailing schooners have found it hard work to compete with steam propelled craft, and yet only a decade ago, these big vessels were making handsome profits by transporting coal from the Chesapeake bay ports to those on the rugged New England coast. In those bygone days the big schooners were quite the main-stay of the coal carrying trade, but due to the keen rivalry of steam craft, the six-masters have found it less profitable in recent years. So much so, in fact that no more big sailing schooners have lately been built. With the burning of the LAWRENCE, the last of the six-masters is now gone. The foundering of the six-masted schooner WYOMING off of Cape Cod three years ago left the EDWARD J. LAWRENCE, the sole surviving craft of the one time proud fleet of American six-masted sailing vessels. But all are now gone to Davy Jones locker, and owing to their being poor profit makers in these modern times, no more of the big sailing fellows have been built.



EDWARD J. LAWRENCE, ONE OF THE LAST SIX MASTERS ON HER COURSE OVER CAPE COD SHOALS—BURNED IN PORTLAND HARBOR

The LAWRENCE saw trans-Atlantic service during the late World war, and since then she changed hands several times. At one of these many deals she brought as high as $250,000 but this was the high monetary mark, in her career for in recent years she has been a poor money-maker, unable to operate at a profit, and so has been compelled to lay idly at her anchors. The EDWARD J. LAWRENCE was built at Bath, Maine, in the year of 1908.

Recent Sales of Ships

T. V. O'Connor, chairman of the United States Shipping board, has announced the following sales of government tonnage:

TUXPANOL, a steel tanker, of 10,250 deadweight tons, built by the Baltimore Dry Dock & Shipbuilding Co. in March, 1921, equipped with Parsons turbines and Falk gears of 2640 shaft horsepower and three Scotch boilers, designed to steam about 10½ knots on 36 tons of oil a day, to the Oil Transport Co. of Baltimore, for the sum of $166,562.50 or $16.25 per deadweight ton. The tanker was sold in accordance with the terms of the advertisement that she would be converted to diesel propulsion.

WEST NORRANUS, a two-deck steel cargo vessel of 8564 deadweight tons, built by the Southwestern Shipbuilding Co. in June, 1920, equipped with a triple expansion engine, 2600 indicated horsepower and three Scotch boilers, designed to steam about 10¾ knots on 34 tons of oil a day, to the Ocean Transport Co. Inc. of New York for the sum of $202,000. At the time of the sale the WEST NORRANUS was laid up at New Orleans.

World Markets

NORMAN, three deck steamship, 7613 gross tons, 6513 deadweight tons, for about £15,000 to Thomas W. Ward, Ltd., Sheffield.

PENTHAW, single deck steamship, 7700 deadweight tons, 4303 gross tons, for about £34,000 to British Hispano Shipping Co., Cardiff.

SVORONO, single deck steamship, 5970 deadweight tons, 3382 gross tons, for about £24,000 to Greek buyers.

GONZAGA, single deck steamship, 4750 deadweight tons, 3134 gross tons, for about £18,500 to Japanese buyers.

RHEIN, double deck steamship, 6600 deadweight tons, 4218 gross tons, for about £19,500 to German buyers.

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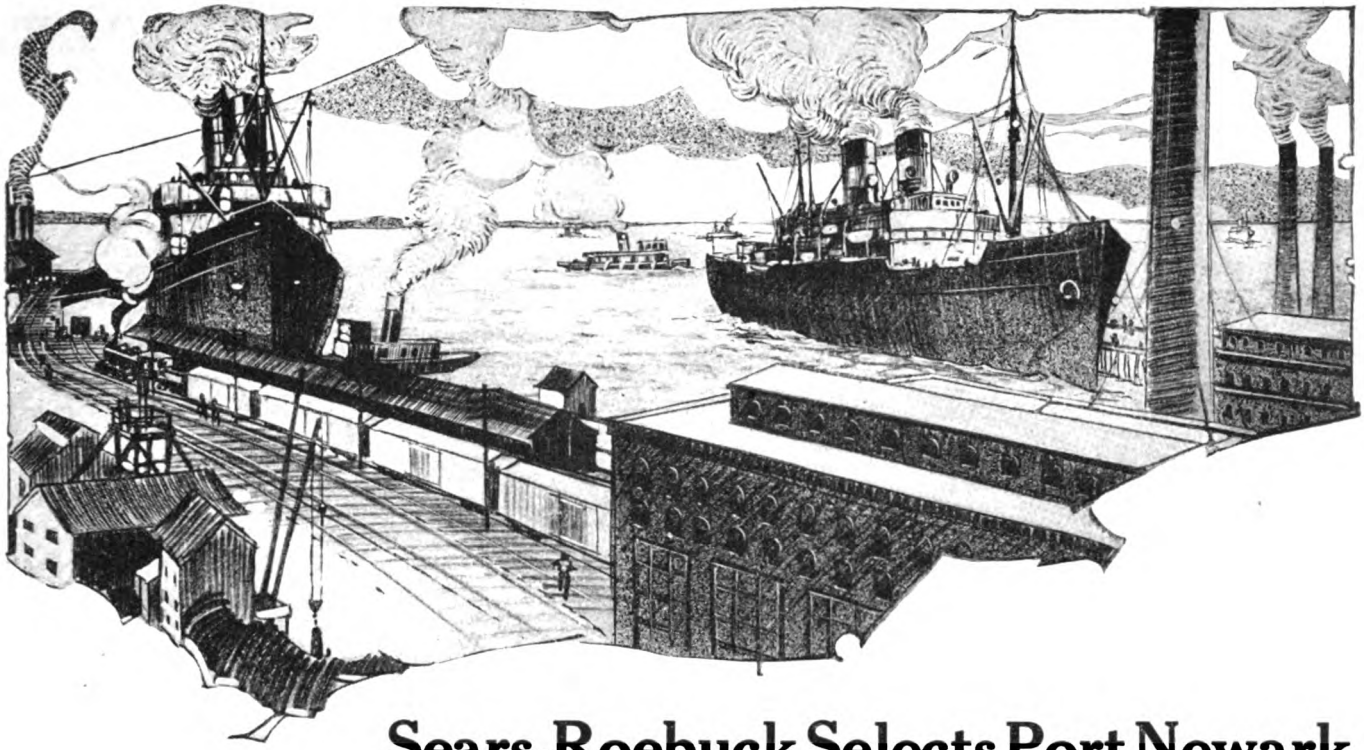
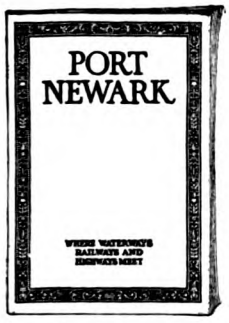


Sears-Roebuck Selects Port Newark As Site of $1,250,000 Plant



Write for a copy of this interesting free book. It contains a wealth of information, not only about PORT NEWARK, but also about the territory contiguous to it. It is well worth reading.

The strategic location of Port Newark in the heart of America's richest markets and raw material sources, and its unusual rail, water and highway transportation facilities were the determining factors in the selection of the SEARS-ROEBUCK site.

The new $1,250,000 factory and warehouse layout will be a manufacturing and distributing base for eighteen of the country's most populous states.

Many other leading manufacturers and shippers are now availing themselves of Port Newark's unique advantages. Every month shows a sharp increase in the volume of raw materials and finished goods handled over the Port Newark docks.

Now is the time for alert shipping executives to study carefully the trend of development at this great, new, *lighterage-free* port within the limits of New York Harbor.

THOS. L. RAYMOND, *Mayor*

Newark **New Jersey**

PORT NEWARK

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Loses Collision Case

(*Continued from Page* 14)

pushing on his starboard bow, his head fell off to port, and that it moved through the southward to the westward in about 22 minutes.

Thus each side had a different explanation to offer for the events which immediately preceded and also followed the disaster. Under these circumstances it is easy to appreciate that the gyro compass record, referred to as the "silent witness," would play an important part in the proceedings. In the early part of his judgment the president of the admiralty court said: "If it establishes the facts for which the defendants rely upon it, it establishes the defendants' case."

It follows that the only chart the plaintiffs took exception to was the one put on the recorder at 4 a. m. and which was replaced by another at 8 o'clock. In considering this record the learned president found it convenient to divide it into two parts—before and after the disaster. The moment of the collision is shown on the record at 4.53½ a. m. by a gap in the course line which was conceded by plaintiffs as probably marking it, and to have been caused by the pen being jolted off the chart by the impact of the two vessels.

The courses prior to the gap were plotted separately on admiralty charts by expert witnesses appearing for both sides. Starting from a point at 4 a. m. in the vicinity of the Nore light vessel, the courses and distance put the ship at approximately the place of collision claimed by the pilot of the MERCHANT.

There was naught then on the chart before the collision to give any reason to suppose that the record did not corroborate the evidence given by witnesses from the MERCHANT that that vessel did not at any time come on to or beyond the normal course up the next reach.

Course Record Shows Position

Proceeding to that part of the record following the gap, the MERCHANT claimed that her head went to port as indicated on the chart, whereas the MATATUA asserted that nothing of the kind happened as the defendants' head went to starboard. It is not necessary to enter into the arguments presented by counsel for each side but it will suffice to say that the president of the court referring to the swing to port of the MERCHANT said, "I am satisfied that it did not take place. That being so, I cannot avail myself of the assistance of the records of the gyro-compass as documents which practically establish their contents."

Having decided to disregard the gyro record, the president was able to continue his judgment on the orthodox lines. Weighing the oral evidence of one side against the other he passed judgment for the MATATUA and found the defendants solely to blame for all that had happened. The court of appeal upheld the judgment given in the admiralty court.

After a lapse of some months the case came before the highest tribunal —the house of lords. Lord Buckmaster, president of the house—after reciting the place and the sequence of events that lead up to the collision, continued as follows:

"I find it very difficult to believe that the compass which on subsequent examination was found to be in order, can suddenly have gone wrong at the moment immediately before the accident, could have continued wrong for fifteen minutes after the accident, then righted itself, nor was it ever stated that in the experience of the witnesses such a phenomenon had ever occurred. I therefore find myself confronted with this difficulty, that the learned president has accepted a story inconsistent with an automatic record which I see but slender reason to distrust.

Concede Importance of Record

"In the result, therefore, I think that as your Lordships cannot allow this appeal without rejecting the verbal evidence of men whom the president believes, the defendants were to blame, this appeal should fail, but I am not at all satisfied that the instrument (gyro-compass) gave as untrustworthy an account of what took place as the learned president believed."

Then followed Lord Atkinson:

"My lords, I have had the pleaspre and advantage of reading the judgment that has just been delivered by my noble and learned friend on the woolsack, and I so thoroughly concur in it that I have nothing to add."

Lord Sumner, in the following words, upheld the decision of the lower courts:

"My Lords, there is no question of law in this case. The matter is one of fact only. Lord Merrivale (president of the admiralty court) did not misdirect himself as to any part of the evidence. After fully considering it he simply attached less importance to the gyro card than the appellants now contend that it deserved. I can imagine no greater responsibility for this house to take than to allow this appeal notwithstanding."

The last judgment was that of Lord Phillimore—an ex-admiralty court judge—who was diametrically opposed to Lord Sumner.

Speaking of the direction of turn of the MERCHANT after the collision, Lord Phillimore said in part: "On this point also the president accepted the evidence from the MATATUA, and he has unfortunately regarded the record on the AMERICAN MERCHANT'S compass chart as being so extraordinary as not to require minute examination.

Defends American Ship's Position

"Now as regards the way in which the two vessels are likely to turn, there does not seem any physical reason why the turn should not have been as the AMERICAN MERCHANT describes it.

"The MATATUA proceeding at full speed and impinging on the bow of the AMERICAN MERCHANT would act, as her own pilot says, like a powerful bow rudder, and would naturally carry the head of the other ship anti-clockwise.

"What your lordships need for your assistance is not a general statement that sometimes these things go wrong, but something which will suggest how it could have gone wrong at this particular moment, when it had brought the ship across the Atlantic correctly, when it correctly recorded the bearings of the ship when she came to anchor, when it accurately recorded the course up the river the next day, and when it was found to be correct on examination when the ship arrived. I might perhaps add, why it should go wrong in one direction before the collision, and in the opposite direction after the collision.

"It cannot be suggested that the pilot would be steering according to the gyro. He would be making his course of lights up the river which he knows well, and it cannot be suggested that an error in the gyro would lead him to go wrong and lead him to let the helmsman go wrong. And it would therefore be a case for the most remarkable coincidence if this compass failed just before this collision.

"Then it is said 'but the president has accepted the evidence of the witnesses, and he is the judge of their value.' Quite so, but he has not rejected the evidence of the witnesses from the AMERICAN MERCHANT as being of itself untruthful or indeed necessarily inaccurate, except in re-

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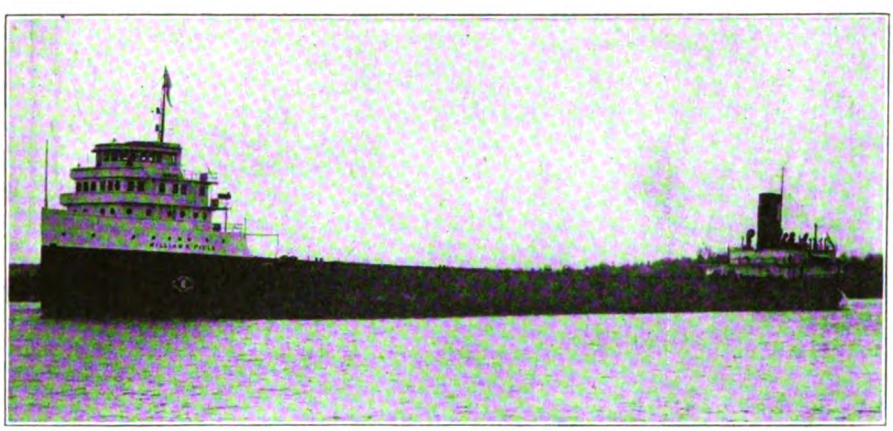
Toledo Shipbuilding Company Inc.

TOLEDO - - - OHIO

Builders of the World's Record Cargo Ship



Steamer William K. Field

604 ft. Long, 60 ft. Beam, 32 ft. Depth. Deadweight Tonnage 12000

OVER half a million tons of freight carried—forty six cargoes of ore and coal delivered in seven months and seventeen days by the steamer William K. Field.

This remarkable performance earned her the title, "Champion Freight Carrier of the World". During the season 1924 on the Great Lakes she registered a total of 552,014 tons. *An unprecedented accomplishment!*

The William K. Field is owned and operated by Reiss Steamship Company, Cleveland, Ohio. Her type of construction permits rapid loading and discharge of cargo. This was an important factor in her record breaking performance.

Builders and Repairers of Ships and Engines

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spect of one statement made by the pilot, and as to this the president is confessedly wrong. What he has said is that the witnesses from the MATATUA—particularly the pilot and third officer—were exceptionally good witnesses, and that he prefers them to those on the other side. Here again, it is somewhat unfortunate that the third officer who is thus relied upon contradicts the pilot and contradicts the case which counsel for the MATATUA invite your lordships to accept, while he confirms the case of the AMERICAN MERCHANT on a somewhat important point. He says that the red light of the AMERICAN MERCHANT not only showed on the port bow of the MATATUA but also drew broader on that bow, which it would do if the AMERICAN MERCHANT steadied. But the case now is that she was starboarding all along.

"It is not right, as it seems to me, to untie the faggot of evidence and break each stick separately, and in my view, therefore, the evidence of the compass record corroborated as it is on the whole by the witnesses, outweighs the bare testimony of the witnesses from the MATATUA and serious as is the responsibility I invite your lordships to hold that this latter vessel was in fault."

It will be observed that Lords Phillimore and Sumner neutralized each other, and the balance of power remained with Lords Buckmaster and Atkinson. The latter found that though they were not at all satisfied that the instrument gave an untrustworthy account of what took place, the appeal could not be allowed without rejecting the verbal evidence of men whom the president believed. This they were unwilling to do, and consequently judgment in favor of MATATUA was upheld.

Lake Engineer Dies

Allen L. Roberts, engineer of Great Lakes vessels for 18 years, died on May 16 in Cleveland as a result of burns suffered in a gasoline explosion on May 1. Mr. Roberts had been chief engineer of the ZENITH CITY, CORSICA, TEAVEY and RUFUS P. RANNEY. He offered his services to the government when the World war broke out, though at that time he was already retired from active service. He was in charge of a number of ships which moved from shipyards on the Great Lakes to the Atlantic coast. He continued in the service of the shipping board until after the Armistice. He was a thirty-second degree Mason. He is survived by his widow.

H. Kempner Appointed Sales Manager

The American Engineering Co., Philadelphia, announces the appointment of H. Kempner as sales manager of its "Lo-Hed" electric hoist division. Mr. Kempner has been in charge of sales promotion work for the American Engineering Co. including the handling of their advertising and publicity, for the last three years. He studied electrical engineering at Harvard University and for four years was an instructor in physics at Pratt Institute, Brooklyn, N. Y. He formerly was connected with the engineering department of the Western Electric Co. in New York, designing telephone apparatus and inspecting and testing central station installations.

Mr. Kempner holds the rank of major, field artillery, officers reserve corps. He served in the cavalry on the Mexican border in 1916, attended the first officers' training camp at Plattsburg and was commissioned captain of field artillery in 1917. He was overseas from 1917 to 1919, participating in the Oise-Aisne and Argonne-Meuse offensives.

W. A. Brady Dies

William A. Brady, marine superintendent in charge of operations and personnel of the Dollar Steamship Co., died in Oakland May 8, from a heart attack. Mr. Brady was one of the best known steamship men on the Pacific coast and his duties with the Dollar line brought him into close contact with a wide circle in the East.

Beginning his career in the old Union Iron Works, San Francisco, as an apprentice, he later went to sea as an oiler on ships of the old Pacific Mail. Before leaving the sea in 1901 to join his father who owned the Eureka Boiler Works, he had become chief engineer.

April Lake Levels

The United States Lake Survey reports the monthly mean stages of the Great Lakes for the month of April as follows:

Lakes	Feet above mean sea level
Superior	600.12
Michigan-Huron	577.82
St. Clair	573.10
Erie	570.80
Ontario	244.92

Lake Superior is 0.07 foot lower than in March, and it is 0.72 foot lower than the April stage of a year ago. Lakes Michigan-Huron are 0.30 foot higher than in March and they are 0.56 foot lower than the low April stage of a year ago. Lake Erie is 0.78 foot higher than in March and it is 0.52 foot lower than the low April stage of a year ago. Lake Ontario is 0.78 foot higher than in March and it is 0.69 foot lower than the April stage of a year ago, 1.13 feet below the average stage of April of the last ten years.

Joins Ingersoll-Rand

Peter A. Sensenig, for eight years in the Westinghouse department of publicity, recently joined the publicity staff of the Ingersoll-Rand Co., 11 Broadway, New York. He will specialize on the Ingersoll-Rand oil engines for marine, locomotive and stationary service. Mr. Sensenig was chairman of the exhibits committee of the American Marine exposition and is a member of the Propeller club, Poor Richard club, New York Maritime exchange and American Society of Port Authorities. He has many friends in the marine fraternity who wish him well in his new work.

Steamboat Inspection

The following letter was sent out on May 4 by D. N. Hoover, supervising inspector general to all supervising, traveling, local and assistant inspectors of the steamboat inspection service: "The season of navigation has commenced and all of you are actively engaged in making inspections of vessels subject to the jurisdiction of this service. Remember that you have a trust to perform in which the lives of the traveling public, men women and children, may be involved. Make your work as perfect as possible, having in mind at all times and before all things, the thought of safety."

Will Operate Malolo For Six Months

Evidently the Matson Line does not believe in separating a man from his responsibilities suddenly or abruptly. William F. Gibbs, the naval architect who is responsible for the design and construction of this seven and a half million dollar liner deluxe, has accepted the job of operating the vessel for a period of six months after she goes into commission.

It seems that this proceedure is based on good common sense. The designer and builder tries out his own product under his own searching eye. The skill and intelligence of Mr. Gibbs will by this method insure to the Matson Line that the MALOLO is properly broken in. And this is important for a fair start.

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How your trucks can handle more freight in a working day

Your electric industrial trucks and tractors start out in the morning full of pep and speed. Does this speed hold up all day long? It should. Read below and you will learn why.

The speed of an electric industrial truck depends upon the voltage of its battery. When the voltage is high, the truck's speed is good.

The long-life, trouble-free, power-full battery

THEREIN lies the secret of the extra speed Exide-Ironclad Batteries give your trucks. An Exide-Ironclad maintains a high voltage throughout the entire day's operation. Not only is the voltage high when your trucks start out in the morning with freshly charged batteries, but also when those trucks return to the charging panel at night.

Packed with power

In addition to its speed, an Exide-Ironclad Battery always has plenty of power. When faced with a steep ramp or extra-heavy load this battery delivers current faster than usual and goes right ahead. It is built so rugged that it hardly ever needs repair. Rare indeed is it for an Exide-Ironclad to spend any time out of service.

Efficient on charge

The charging efficiency of this battery is enough to delight the heart of any battery man. It takes current in easily, quickly, and with very little waste. Its life is long and its first cost reasonable. Don't fail to learn all about this cost-cutting battery that has worked such wonders for the handling system of so many leading steamship companies.

Send now for a free copy of our booklet, "15 Points of the Exide-Ironclad Battery."

Exide
IRONCLAD
BATTERIES

A few of the many companies that use Exide-Ironclads

Ocean Steamship Company
New York

International Mercantile Marine
New York

New England Steamship Co.
New York

French Line, New York

Eastern Steamship Company
New York

Luckenbach Steamship Company
Philadelphia

Hudson Navigation Company
New York

Kerr Steamship Company, New York

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia

Exide Batteries of Canada, Limited, 153 Dufferin Street, Toronto

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Complete Modern Dredge

(*Continued from Page* 20)

the after cargo hold of the vessel.

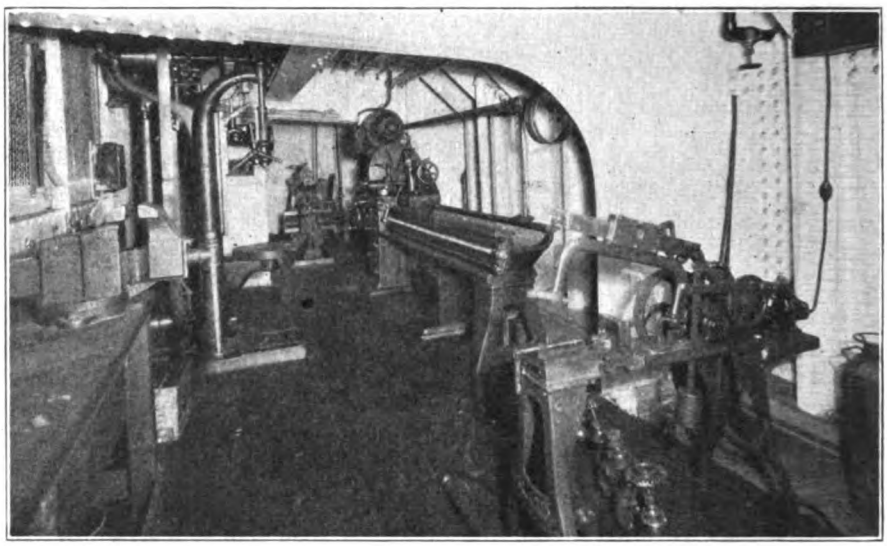
When the ship is under way control to vary the speed, to start, stop and reverse is of the Ward Leonard type. It is of course necessary to run the main engines to generate power to run the entire plant. By means of the Ward Leonard control which is really a generator field control, that is, a matter of excitation, so that the main engines can continue to run at constant speed under any conditions of load. The governing of the engine is accomplished by throttling the fuel supply by regulating the fuel pump suction through the means of a centrifugal governor of Massey type.

A smaller diesel electric generating set consisting of a 2-cylinder, 2-cycle solid injection Worthington engine of 60 horsepower driving an Engberg generator of 40 kilowatts is provided to take care of the lesser power requirements while the vessel is in port and not unloading. Both the propellers and the sand pumps may be operated at will either from the engine room or from the pilot house direct.

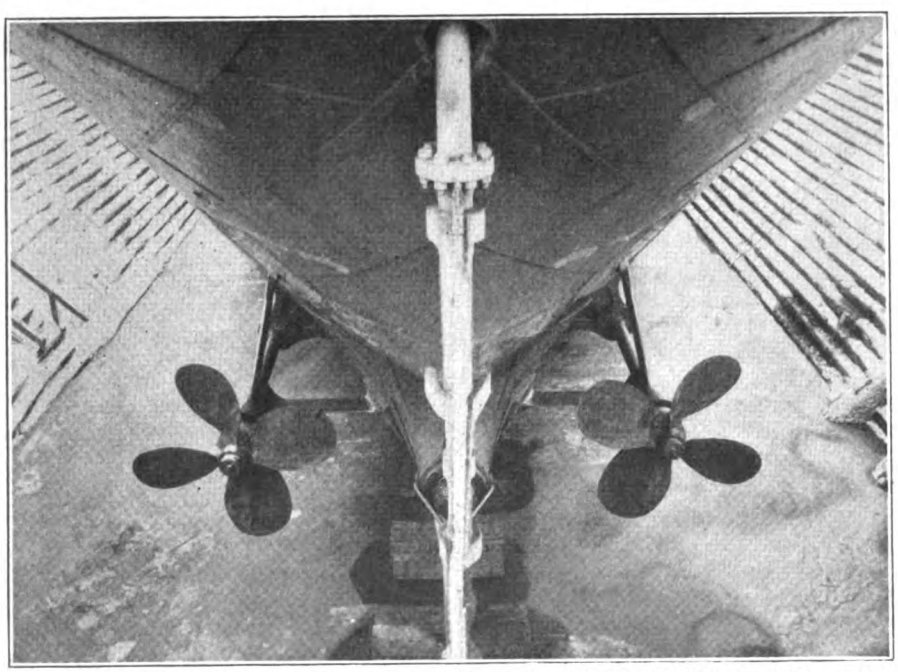
All fresh water will be carried in two 12-ton tanks of rectangular shape placed one on each side under the aft cargo hold and near the engine room bulkhead. There is a well equipped separate electrician's storeroom with work bench, and a similar storeroom for the engineers.

The switchboard on which are mounted the controls for the entire ship extends across the ship on the after engine room working platform. It is 23 feet long and has 6 feet of clearance behind. Each generator is connected to drive its own motor. Either generator is connected to drive both motors in series. Either generator is connected to the D. C. panel from which the sand pumps are driven while the other generator is at rest or driving the propelling motors, and both generators are connected to the D. C. panel from which the sand pumps are driven. Overload relays are located in each generator circuit and are so arranged that the field contactor is opened in case of an overload.

Deisel engine fuel oil is carried in the No. 3 double bottom which holds about 60 tons. There is also a built-in deep tank the forward side of which is a part of the after engine room bulkhead. This tank does not go to the tank top nor to the sides of the ship. It has a riveted division plate and is fitted with swash plates. Heating coils have been fitted around the fuel suctions. The capacity of this tank is 114 tons. For daily service there are two 1000 gallon rectangular fuel tanks. There is also a 1000 gallon cylindrical lubricating oil supply tank and a 500 gallon lubricating oil settling tank with heater coils in it. The lubricating oil is passed through a DeLaval oil purifier. There are two oil purifiers on board.



WELL EQUIPPED MACHINE SHOP ON BOARD THE M. S. SANDMASTER



DIESEL ELECTRIC HOPPER DREDGE IN DRY DOCK AT THE AMERICAN SHIP BUILDING CO., CLEVELAND, FEB. 27, 1926, AFTER COMPLETING THE INSTALLATION OF TWIN SCREWS. NOTE THE STRAINER OVER THE OLD STERN TUBE. WATER IS TAKEN IN THROUGH THIS APERTURE WHEN DISCHARGING SAND

For refrigeration an Isko ice machine of approximately one ton capacity has been installed. This machine is operated by a direct connected electric motor and is automatically controlled. It is located at the extreme after end of the vessel close to the refrigerating box. The temperatures in the meat box and chill room are automatically controlled. Cold drinking water is obtained by passing the water through a coil in the chill room before it goes to the outlets all over the ship.

On deck the steering gear is of the Hyde hydro-electric type. The old steam anchor windlass built by the American Hoist & Derrick Co. was electrified and is direct gear driven. There is an electric mooring winch forward and two electric winches located forward of the saloon. for handling the flexible suction hose. There is also an electric mooring winch on the poop deck. The winch for handling the stern anchor is the old one electrified.

After the SANDMASTER has been op-

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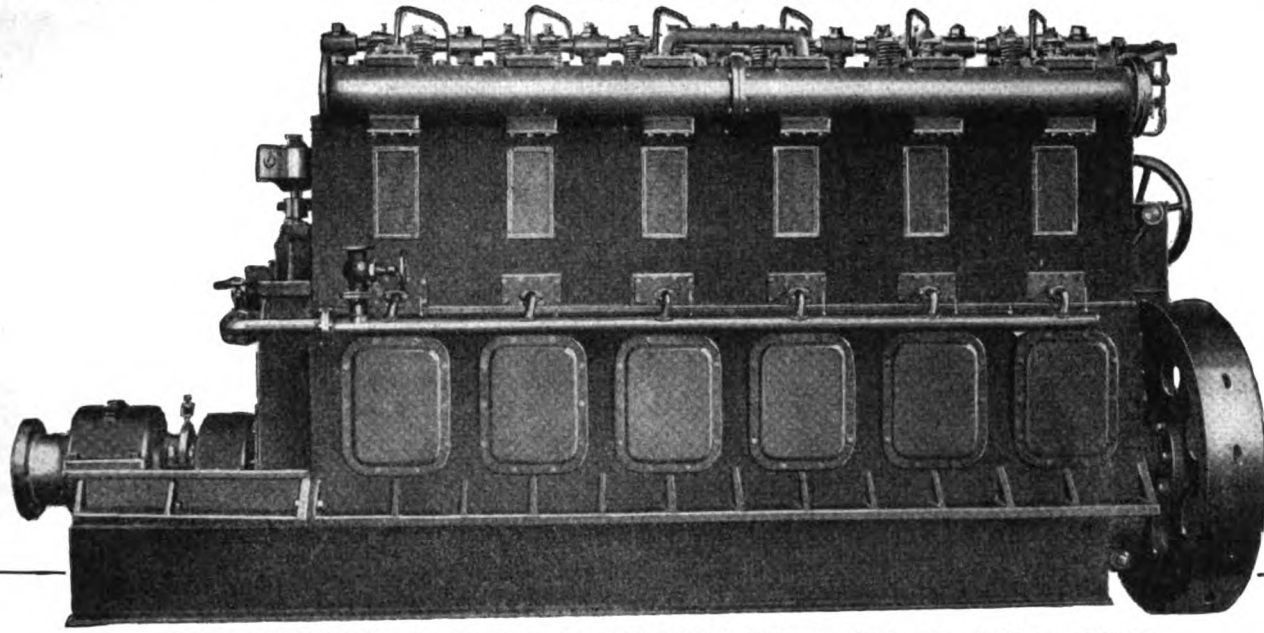

Nelseco Type M. I. Marine Diesel Engine, 300—350 B. H. P., 6 cylinder, 4-cycle, Type 6 MI-18.

Advanced Features of Diesel Engine Design

The following are a few of the distinctive features of the Nelseco M. I. Diesel engine:

SIMPLICITY—Less moving parts than the average Diesel engine with resultant increase in reliability and durability.

RUGGEDNESS—Rigid cylinder block construction with through steel tie bolts, extending from top of block to bed plate.

ACCESSIBILITY—All parts easily accessible for inspection or repair.

MECHANICAL INJECTION—The elimination of the air compressor assures more consistent service and lower maintenance costs.

EFFICIENCY—An exceptionally long life and low fuel consumption. These facts have been proven time and again both in tests and in actual service.

Write for Pamphlet MR, which describes in detail these and other distinctive features of the Nelseco Mechanical Injection engine.

NEW LONDON SHIP & ENGINE COMPANY
Groton, Conn., U. S. A.

Nelseco Diesels are built under M. A. N. patents; in 4-cycle, single-acting type, from 100 to 850 H. P.; in 2-cycle, double-acting type, from 1,000 to 10,000 H. P.; mechanical or air injection; suitable for yachts, tugs, freight and passenger vessels. A 180 H. P. Nelseco Diesel is conveniently placed for your examination at our sales office.

PORT ELCO
247 Park Ave., New York, N.Y.
Demonstration made on appointment

NELSECO

Original licensees from and collaborators with M.A.N. since 1910

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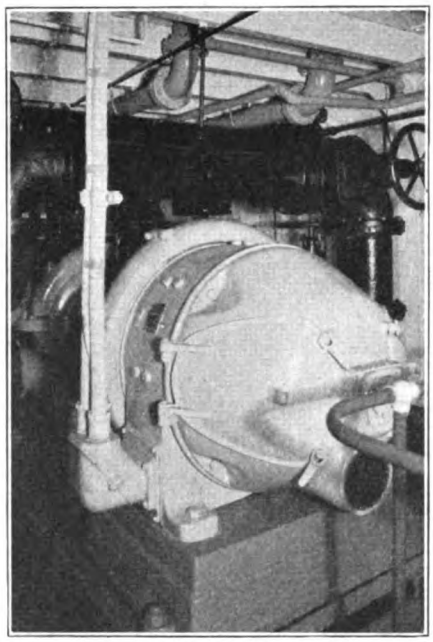
erated for a year it would be interesting to make a comparison between this vessel and the SANDCRAFT which is practically a sister ship. The SANDCRAFT is entirely steam operated, while the SANDMASTER is entirely diesel electric.

Lower Cost of Operation

A tentative calculation might be made as between the steamship and the diesel ship. The fuel consumption for full power on the basis of 24 hours and rated engine consumption per horsepower per hour should be about 6 tons of diesel engine fuel oil. A similar steamship with equivalent power might burn 20 tons of coal per day. On this basis and allowing 5 cents a gallon for diesel fuel oil and $5.00 a ton for coal the fuel saving per month working 20 days would be in the vicinity of $500.

If we set down only that part of the crew which has to do with the engine room we might find that the steam job would take the following per month: Three oilers at $315, four firemen at $420, two coal passers at $200, two pump men at $300 and one handy man at $125. This will give a total payroll of $1360 per month. On the diesel-electric ship we would find per month; two motor men at $250, one electrician at $150, and one machinist at $150, or a total of $550 for the month. This would seem to indicate a saving of approximately $800 per month in crews' wages. Adding to this the fuel saving of $500 an apparent saving would result of $1300 a month.

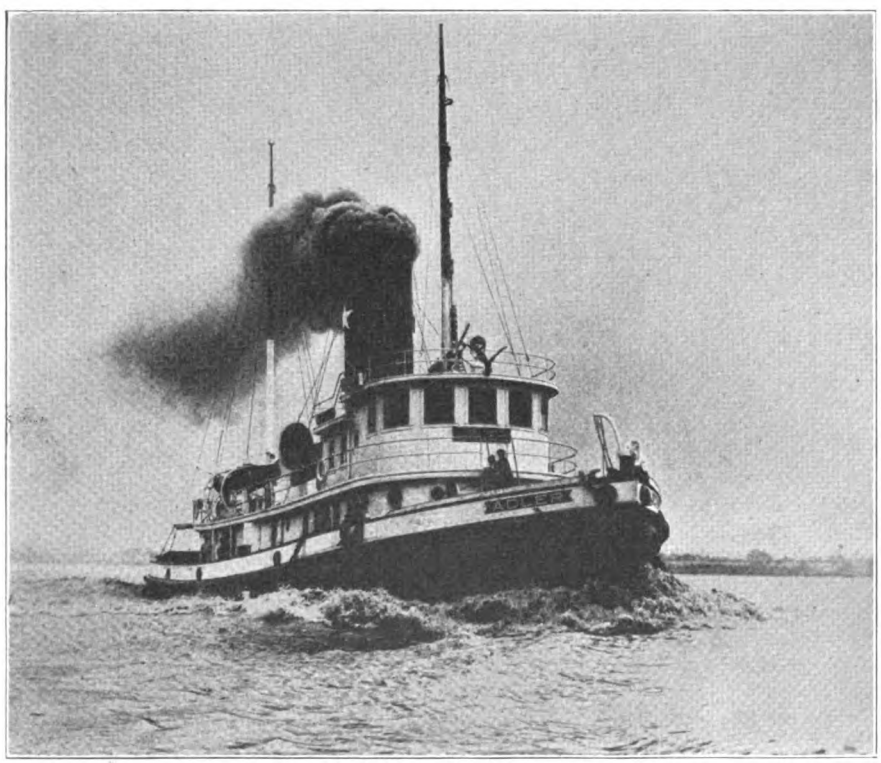


JET PUMP AND MOTOR

The SANDMASTER has according to the owner the highest class in both the American Bureau of shipping and in Lloyds. Both the Worthing Pump & Machinery Corp. and the General Electric Co. and their highly trained and efficient staffs deserve a great deal of credit for their co-operation and help in the arrangement and development of the mechanical and electrical details of the engine room.

Maker of Propellers Began in 1854

JAMES SHERIFFS came to Milwaukee in about 1850 from Scotland and in 1854 started a foundry and machine shop on the south side of the Milwaukee river on South Water street. This shop did ordinary machine work, ship repairs and blacksmithing for sailing vessels, and engine work on steam vessels. Here were also built marine engines which resulted in going into the building of propellers. This business continued to this day at the same location, is known as the Sheriffs Mfg. Co. and in latter years has specialized in the making of good propellers.



TUG ADLER BELONGING TO W. G. COYLE INC., NEW ORLEANS, FITTED WITH A SHERIFFS PROPELLER TOWED THE SECTIONS OF A 10,000-TON DRYDOCK FROM NEW YORK TO MOBILE IN A SUCCESSION OF SEVERE STORMS

James Sheriffs the founder died about 1887, and the son, Thomas W. Sheriffs continued the business from that time until 1924 when F. W. Jarcho who had been associated with Mr. Sheriffs for quite a number of years became manager. The business is steadily growing and the past year showed a considerable increase over previous years.

The reputation of the company for propeller wheels was so widely recognized that it became one of the leading concerns in that line. Prior to this many wheels for vessels on the Great Lakes were made by the famous old firm of Neafie and Levy of Philadelphia, now long since out of business. This meant that a firm specializing in propellers had become firmly established and well known on the Great Lakes. As the years went on the reputation of the company spread outside of the Great Lakes and wheels are now made for vessels in all parts of the United States, as recently indicated by furnishing wheels for the large Standard Oil tug ISTROUMA at Baton Rouge, La., taking an 11-foot diameter four bladed solid cast iron wheel, and twin wheels right and left, 8 feet 6 inches in diameter for the Standard Oil Co., tug MCDOUGALL of the same place. There was also recently shipped, a 10-foot cast iron wheel for the tug BOSWELL of the Alexander Construction Co.,

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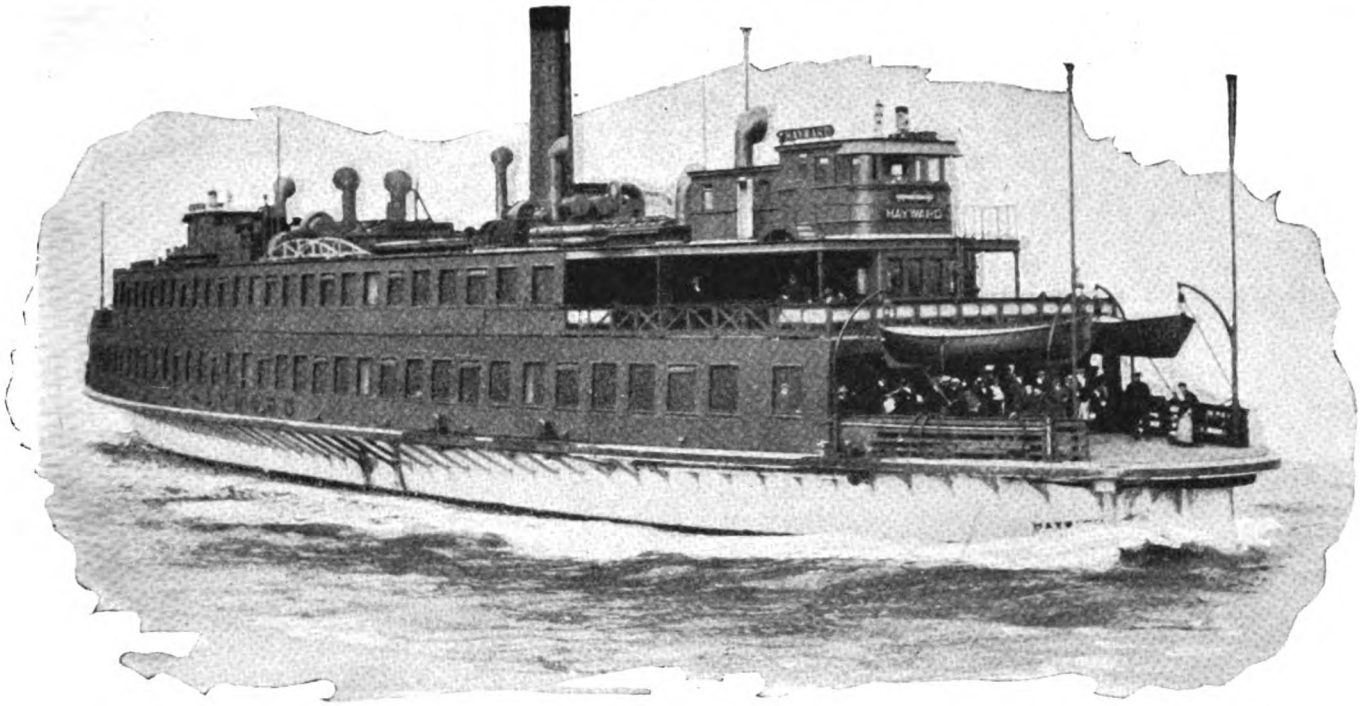

Three points of superiority—*proved*

Verification of the value of electric propulsion for ferries is contained in the following reports relating to the operation of the Key Route System ferries "Hayward" and "San Leandro", placed in service in May, 1923. Both these ferries have G-E Turbine-electric Drive.

1. Fuel Economy

Investigation shows these boats to be very economical of fuel. The "San Leandro" carries 3224 passengers across the bay with the same fuel consumption required by one of the older boats to carry its full capacity, which was only 1700 passengers.

2. Reliability of Service

No less has been their economy in maintenance. Instead of the customary practice of making engine repairs every five or six weeks, the consistent daily operation of electric drive for periods of several months has enabled the owners to maintain uninterruptedly a schedule such as never before attempted.

3. Public Good Will

These ferries make 55 trips daily, each carrying a total of 30,000 passengers on busy days. They have gained a high place in public favor, judging by the steady increase in traffic handled.

Each year more ship operators are learning by experience the economic advantages of specifying G-E Equipment throughout.

6-22

GENERAL ELECTRIC

GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y., SALES OFFICES IN ALL PRINCIPAL CITIES

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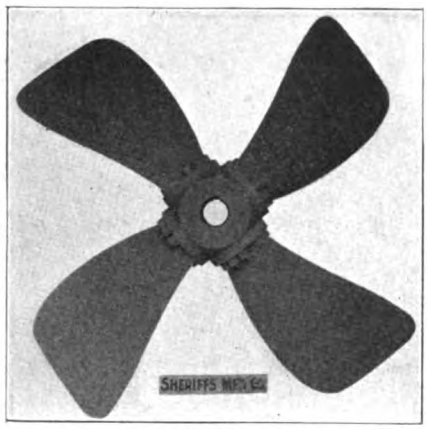
of New Orleans, and an 11-foot four bladed cast iron wheel for the tug R. W. WILMOT of the New Orleans Coal & Bisso Towboat Co.

At present there is under construction a four bladed cast iron wheel 8 feet in diameter for Fitz Simons & Connell Dredge & Dock Co., Chicago, for a new tug building at Manitowoc Ship Building Corp. A new 11-foot diameter cast iron wheel for the large tug BALLEW of the Detroit Sulphite Pulp and Paper Co., Detroit, has recently been completed.

Wheels, of cast iron and steel, and where called for, of bronze, are made by this company in all sizes required from the smallest to the largest propeller used. Up to about 12 feet 6 inches the wheels may be solid but above this, the sectional type with



A DETACHABLE BLADE PROPELLER WITH ADJUSTABLE PITCH DESIGNED AND BUILT BY THE SHERIFFS MFG. CO., MILWAUKEE

adjustable pitch arrangement is used. Great care is taken in procuring pig iron of the highest quality and Lake Superior charcoal pig iron is used exclusively in cast iron wheels.

The foundry work is carried on by men of long years of experience in the specialty of propeller molding. The pattern work is also done with the same care and accuracy. These wheels have a reputation for high efficiency and strength.

Build Docking Caissons

The United States engineer office at Huntington, W. Va., will receive sealed proposals until June 12 for the building and delivery of three steel docking caissons for the Ohio river. Further information may be had by applying directly to that office.

The usual opening date for the New York State barge canal is May 1, but due to freshet conditions the opening was delayed until May 8 this year.

Asa F. Davison Organizes Steamship Company

Capt. Asa F. Davison, at one time marine superintendent of the United Fruit Co. and later vice president of the Emergency Fleet Corp., has organized a new steamship line to operate on a weekly schedule between Boston, New York, Norfolk and Texas City, Texas. The new line has been named the New England and taxes Steamship Corp. or "Newtex Line" for short.

Capt. Davison is president; William J. O'Toole, vice president and treasurer; N. V. Rodney, vice president and traffic manager; and J. H. Moore is marine superintendent of the new company. The offices of the company will be located at Pier 7, East river, New York. Several lake type cargo vessels were acquired from the shipping board some time ago. The new service will be inaugurated with the trip of the steamer BRUNSWICK due to sail from Boston June 15, New York June 19, Norfolk June 21 and from Texas City for Boston direct, July 3.

The line will be represented at Boston by C. H. Sprague & Son, Inc., at Norfolk by the Southgate Forwarding Co., and at Texas City by the T. R. Rogers Forwarding & Storage Co.

Byrd Likes the Chantier

On Feb. 25 the United States shipping board granted to Lieutenant Commander R. E. Byrd the use of the S. S. CHANTIER to conduct an expedition which had for its purpose investigation and exploration in the scientific fields of oceanography, geography, meteorology and navigation. On May 18 the shipping board received the following telegram from Commander Byrd: "CHANTIER a wonderful ship. Very grateful for the part you played in our success."

United Fruit to Build

The United Fruit Co., according to report, plans to construct nine combination passenger and fruit carrying vessels for the expansion of its European and American trade. The vice president of the company, William Newsome, is now in Europe with the view of placing the shipbuilding orders. Six of the new ships will be built in British yards and will be operated in the European trade between Central American and West Indian ports. These ships will be of 8000 tons each with a speed of 14 knots. Special refrigerating machinery will be installed. Three ships of the program intended for American service will be built in the United States. Specifications have now been in the hands of American shipbuilders for some time. These ships will be 5000 tons with a speed of 15 knots and it is expected that they will be operated out of New Orleans.

Chatham is Completed by Newport News

The CHATHAM, the first of the three palatial new coastwise steamers building for the Merchant and Miners Transportation Co., Baltimore, by the Newport News Shipbuilding & Dry Co. successfully completed her trials off the Virginia capes May 8. This vessel is 362 feet long, 52 feet beam with one 2700 horsepower triple expansion engine, and has a sea speed of 14 knots. She is specially built for the Southern service. A number of the rooms have private shower baths and all have showers, electric fans, and large windows. Those on the upper decks have large windows and special screened doors to permit further ventilation. In addition to a social hall there is a large dance hall and sun-parlor. Accommodations are provided for 302 first-class passengers and 12 steerage.

The vessel is provided with every aid for safe and efficient navigation including a Sperry high intensity searchlight, engine speed indicator, gyro-compass with bearing position, steering position and course recorder, and a self-synchronous helm angle indicator.

The CHATHAM left Baltimore on May 18 for Jacksonville and around the middle of June will enter her regular service on the Boston-Baltimore run. Her sister-ship, the DORCHESTER, will be completed and ready to join the fleet about the middle of July and the FAIRFAX will follow a month later.

Andrew C. Loudon

Andrew Charles Loudon, vice president of the Superheater Co. Ltd., Montreal, died at his residence, in Burlington, Vt., on April 11. Death resulted from pneumonia. Mr. Loudon was born July 7, 1883 at Valleyfield, Que. and he was graduated from McGill University in 1906, with a degree of bachelor of science. He became associated with the Superheater Co. of New York in 1917, and in 1920 was placed in charge of the Superheater Co. Ltd., of Canada.

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Towing

AN important part of a railroad's business in that maelstrom of marine activity, New York harbor, is towing. Congested water traffic to dodge, hundreds of freight cars to transfer in the shortest time—tug boats have a tough job.

Good reason then for the extra edge that Westinghouse Diesel electric propulsion equipment and pilot house control assures.

The maximum power is on tap at will—no steam to maintain, no coal, no boilers, no dirt. Minimum stand-by losses.

Bridge control assures the fastest maneuvering—no signaling. The pilot throws a lever for ahead or astern at full speed, half speed, quarter speed or any fractional speed—the response is instantaneous.

The Pennsylvania Railroad proved this; now they have six Diesel electric tugs, all Westinghouse equipped. The Long Island Railroad and Wilmington Transportation also have installed Westinghouse equipment.

Eventually all railroads will adopt this superior tug boat drive because it means:

Greater towing capacity
Quicker turn around
Greater profits

Westinghouse Electric & Manufacturing Company
East Pittsburgh Pennsylvania
Sales Offices in all Principal American Cities
Service Stations in Principal American Ports

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Fleet Cuts Fuel Costs

(*Continued from Page 22*)

It will be noted that this condition is more uniform with the fuel oil. This is also brought out in the accompanying chart based on the figures given above, which show a regular drop in the fuel combustion as the horsepower is stepped up. The coal efficiency increase however is more marked with the large power units due to the fact principally that they work the full twenty-four hours of the day and very seldom bank their fires.

We turn next to the relative ecenomy of the two kinds of fuel. To do this we will take the average price prevailing for both during the calendar year 1925. To the same point of delivery the coal cost was $0.0039 per pound and the fuel oil cost was $0.0054 per pound. For the entire fleet the difference per horsepower hour was in favor of the fuel oil as follows:

	Coal	Oil	Difference in favor of Oil
Tug boats	$0.009789	$0.006858	$0.002931
Steam lighters	0.011388	0.008856	0.002532
Ferry boats	0.005733	0.004570	0.001163

When this is applied to the operation of the entire fleet per hour the savings with the use of fuel oil would be separated as follows:

	Coal	Oil	Difference in favor of Oil
Tug boats (13064)	$127.88	$89.59	$38.29
Steam lighters (1800)	20.50	15.94	4.56
Ferry boats (12600)	72.24	57.58	14.66
Total saving per hour			$57.51

However, fuel economy is not alone the sole factor that must be taken into consideration. Each additional advantage may be itemized in the following order, namely:

(1) Time saved in taking fuel aboard.
(2) Time saved in dumping ashes and operating ash scow.
(3) Release of firemen on large boats.

From a careful analysis it has been possible to establish the relation of time lost in taking on the two fuels. The fueling operation with oil takes only about half the time that it takes for coal and the coal burning boat carries 75 per cent more fuel. The saving in time in loading and the saving in number of times per year necessary to fuel show a time economy of oil over coal of four-tenths of a minute per service hour.

No effort is made here to capitalize this time as the operating costs of tugs have too great a spread. The above time saving ratio, however, can be used in calculations of savings with any tug if the operating costs are known.

The operation of ash removal harbor craft is not as simple as that of ocean liners. For harbor ash removal it is necessary to have an ash scow anchored at a convenient spot and ashes are removed at least once during every 24 hours. This operation alone occupied 7 per cent of the service time for the average tug boat.

In addition to the removing of ashes from the tug boats, it is necessary to remove the ash scow so that it in turn be cleaned. This expense has not been studied. It is not known what it would amount to during a year, but it is an additional expense. Of course, it must be realized that this would not apply to all harbor craft, as in some waters ashes are dumped in a convenient spot.

In large boats where two firemen are necessary, oil burners will relieve one of them. In ferry boats, steam lighters and large tug boats, this situation prevails. The savings here are governed, of course, by the type of boats constituting the fleet.

This article was written not only for a comparison of fuel costs of coal and oil under steam boilers. It also is intended for use as a comparison of still another prime mover, the diesel. In order to leave some sort of continuity therefore for an ensuing article an estimate is given of the fuel consumption of two tug boats which are now being converted to diesel-gear drive.

These tugs which may be designated A and B showed the following pounds of fuel consumption per horsepower hour for coal and for oil under boilers before conversion:

Tug	Coal	Oil
A	2.84	1.99
B	3.06	1.98

It will be noted that they used about the same amount of fuel oil but the difference in amount of coal is marked. They had the same size boilers and engines and are of exactly the same dimensions as to hull and house. They were both rated 300 indicated horsepower. The steam engines are now being replaced by two different makes of engines of different size geared to the tail shaft with Falk gears and Metten clutches.

The fuel cost of operation before conversion for these two tugs at the 1925 prices of fuel were as follows per fuel burning hour:

Tug	Coal	Oil
A	$3.3228	$3.2238
B	3,5802	3,2076

This cost per service hour will be relatively higher as fuel consumed in getting up and keeping up steam makes up a big part of the fuel burning hours. Our readers can make a guess of guaranteed fuel consumption of the various diesels from the given data but at a later date after the converted tugs have been through a sufficiently long period of service, about next January an effort will be made to give a fair and accurate account of fuel consumption and operating expense.

By keeping correct records and watching carefully the expense of operation and by taking advantage of greater efficiency in methods of combustion and in prime movers a saving of startling magnitude could undoubtedly be made in present cost of operating many large and small harbor fleets.

Diesel Patrol Boats for U. S. Coast Guard

The United States coast guard has invited bids on 32 to 35 steel twin screw diesel engined patrol boats, 125 feet in length overall, 120 feet in length on the water line, 23 feet 6 inches in molded beam on the water line and with a displacement fully loaded of about 220 tons. The main propelling machinery will be two diesel engines with a total shaft horsepower of 300. The bids were opened at the office of the United States coast guard, Fourteenth and E streets, N. W., Washington, on May 24. The results of the bids were not known in time for inclusion here. It is expected that the large yards on the Atlantic coast entered bids.

A bill was reported to Congress April 28, 1926 providing for the construction of ten first class cruising cutters for the use of the coast guard. In connection with this bill the secretary of the treasury said: "The most efficient administration and the best far-sighted economy in my judgment, call for the construction of the ten cruising cutters contemplated in the bill." The President said in his message transmitting the budget for 1927, "While the initial cost of these cutters is large, we will effect an economy, as they will replace the destroyers now being used and which are expensive of operation. The normal functions of the coast guard alone require these additional cutters, so that their construction will serve a two-fold purpose."

Diesel Tug for Canal

The commissioner of canals and waterways, state of New York, Thomas F. Farrell, received bids on May 14 for the construction and delivery at barge canal terminal, Albany, N. Y., of one steel screw diesel towboat for the department. The Bethlehem Shipbuilding Corp. bid $55,000. All bids were rejected.

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PLYMOUTH *The Rope You Can Trust*

Ship Chandlers everywhere handle Plymouth Cordage

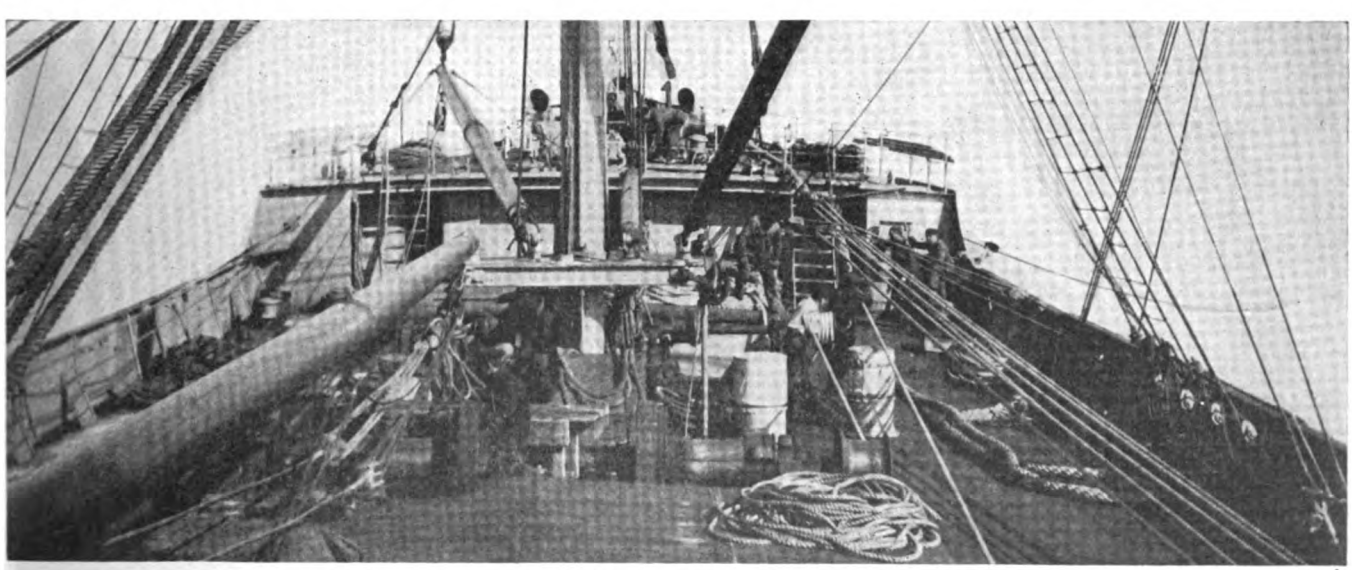
SAFETY and economy *should* be combined in marine cordage. In emergencies, the lives of men may depend on the davit ropes; the ship itself may depend on the strength of the hawsers. To the responsibility placed on rope in times of stress is added the everyday reliance upon it to unfailingly carry the bulk of the burden of heavy haulage aboard ship.

You can trust Plymouth Rope. Every Plymouth product bears the workmanship of America's oldest and largest rope-making organization. Each is made under a fixed policy of first-quality goods only; each is the uniform result of an unequaled supply of raw materials worked by experts on specially developed modern machines—a manufacturing standard, equipment and power without equal in the rope industry.

These things are your guarantee of the superior quality of Plymouth Cordage.

PLYMOUTH CORDAGE COMPANY

North Plymouth, Mass. Welland, Canada



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Prove Rotorship Claims

(*Continued from Page* 25)

type of rudder is practically essential, as soon as we exceed a certain size.

"The principle of the rudder is briefly this: Just as the main rudder steers the ship, a very small auxiliary rudder attached at the rear end of the main rudder steers the main rudder. I therefore steer the ship by steering the rudder.

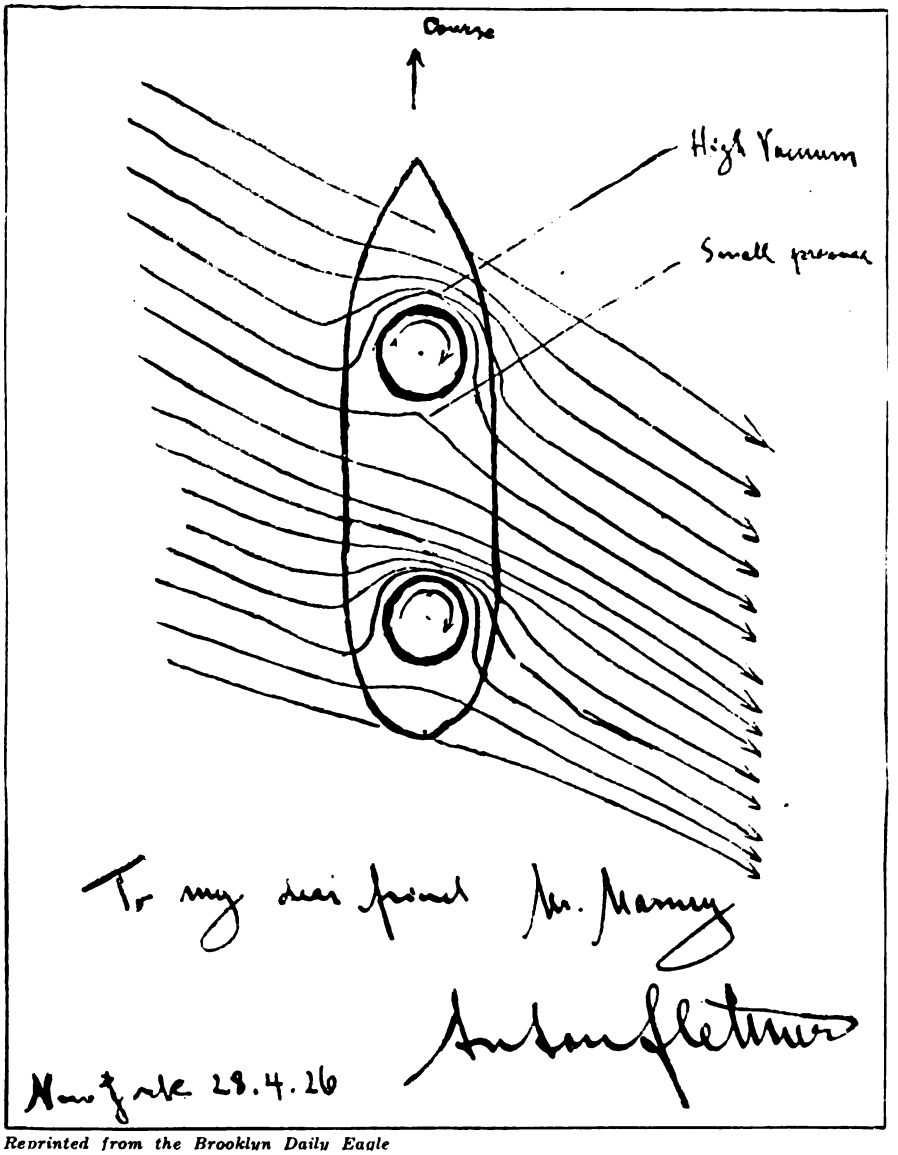
"The principal advantages are: Greater safety because we do not hold the rudder rigidly in position by a single tooth, which causes the most severe strains in a heavy sea. It is perfectly free to give way when a big wave strikes it and does not transmit this shock to the vessel. The result is a much greater steadiness on the course. On ships where my rudder was installed together with the automatic gyro-compass, the 'Iron Mike,' it was found that, especially in a heavy sea, the steering curve was greatly improved.

"The other advantage of the rudder is the saving due to the use of a steering engine which requires less than 10 per cent of the power of the ordinary type, that is, we save 90 per cent of the power consumption of the steering engine.

"After the rudder had been developed, I was trying to employ the same method on the metal sail on which I was working. I planned to replace the canvas sail by a metal sail designed exactly like the wings of a metal airplane. In order to learn about the canvas sail which I was trying to replace, I had a series of experimental investigations made at the aerodynamic laboratory of the University of Goettingen. I was greatly surprised to find, as a result of these tests that the canvas sail for yachts and other modern craft in the course of thousands of years of use had gradually been developed quite ir accordance with the laws of aerodynamics. I therefore came to the conclusion that the canvas sail itself was not capable of much improvement.

"Tests in the university laboratory as well as practical tests on a boat in Kiel harbor proved that even the metal sail did not give more than 30 per cent better results than canvas sails.

"Prospects seemed to be better when one day I thought of the so-called Magnus effect, which had been known since 1852, but had never been applied for any useful purpose. I immediately applied for patents and then had the whole subject thoroughly investigated at the Goettingen laboratory, where purely theoretical tests had been under way for some time, without regard to the application of the principle.



Reprinted from the Brooklyn Daily Eagle

A FREEHAND SKETCH PREPARED BY ANTON FLETTNER TO ILLUSTRATE THE PRINCIPLE OF THE ROTORSHIP TO HIS FRIEND A. F. MASURY, VICE PRESIDENT AND CHIEF ENGINEER OF THE INTERNATIONAL MOTOR CO. PRACTICAL TRIALS HAVE DEMONSTRATED THAT THE RESULTS CORRESPOND WITH THE VERY SIMPLE GRAPHIC DEMONSTRATION

The Principle of the Rotorship

"Finally we concentrated on tests with a true model of the schooner BUCKAU which is now the BADEN-BADEN. These tests were very thorough, extending over six months, and were of the greatest importance to me, because on the basis of my tests, we were in a position to predict with accuracy the dimensions and proportions of the rotorship as you see it today. No changes whatever have been made since the BUCKAU was first equipped with the rotors. Diameter and height of rotors, distance between them, number of revolutions of the shell, relation of speed to wind velocity, everything was known beforehand. Quite startling was the fact that the end pieces or flanges added about 100 per cent to the force developed.

"Now a few words about the principle. The rotor consists of a cylinder perfectly smooth on the outside and closed at top and bottom. It is rotated by an electric motor, the speed of which is regulated from the bridge in accordance with the wind velocity. The simplest way to understand the action is the following; When the wind reaches the rotor, it meets on one side a thin layer of air, dragged along by the surface of the rotor and traveling in the opposite direction. The result is that on this side the air is brought al-

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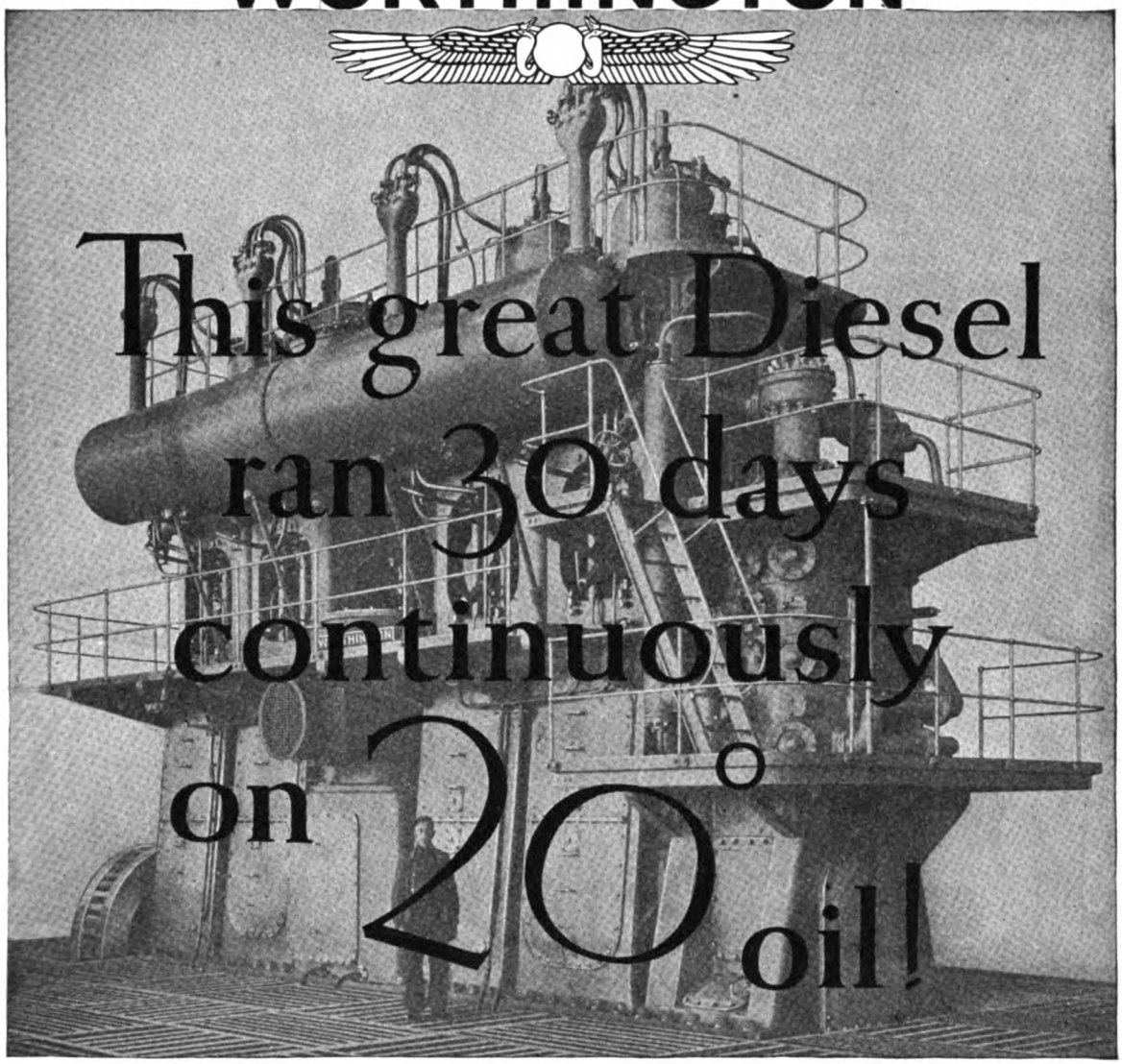
WORTHINGTON



NEVER before has a record like this been made! Official witnesses expected to see a wonderful engine pass a stiff test, but Diesels generally use special oil. The Worthington engine surprised them.

Using only low-priced Navy bunker oil B, cheaper than special Diesel oil, a 2900-hp. Worthington Diesel ran under full load continuously for thirty days—and apparently could have kept it up for another month! It was one of the Worthington Diesels built for Shipping Board vessels, and the test was made under Government supervision. The thirty-day run equalled three trans-Atlantic trips without making port. The fuel oil used showed these average characteristics:

Gravity Baumé at 60° F . . .	20.19
(Some samples tested as low as 14° Baumé)	
Flash point deg. F	177
Burning point deg. F	270
Viscosity Saybolt-Furol at 77° F. 64 sec.	

Burning this heavy, inexpensive oil, the Worthington Diesel exhibited a clean, consistent performance throughout the test. So far as can be learned, no other Diesel has ever passed so severe a test under official supervision as this purely American engine.

When taken down for examination after trial, the liners were found covered with a continuous oil film, and under this the surface was found polished and entirely free from any trace of score or burnish. Wear averaged only 0.002 of an inch. Piston rings were entirely free, clean, well-oiled and floating in the grooves. Piston rod packings were equally satisfactory. Piston rod wear was only 0.001 of an inch. Spray nozzles were found free of carbonized oil, the engine having shown clear exhaust during the entire run.

7231-30

WORTHINGTON PUMP AND MACHINERY CORPORATION
115 BROADWAY, NEW YORK CITY, BRANCH OFFICES IN 24 CITIES

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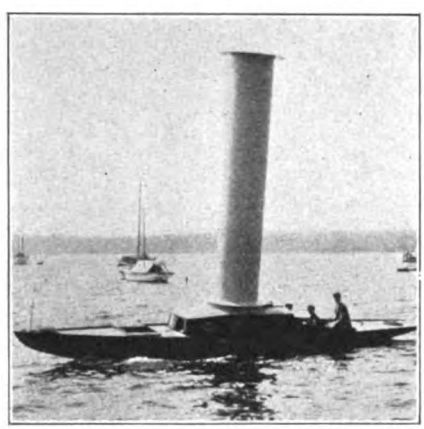
most to a standstill, producing a certain pressure. On the other side of the cylinder the wind meets ideal conditions, namely it passes along a body the skin of which offers no friction, because it is traveling in the same direction. Now since the wind cannot pass on the pressure side, it tries to find the easiest way and thus is deflected to the other side. That however means that the air particles have to speed up, and according to a well known physical law, acceleration results in a decrease of pressure. So that we have pressure on one side and a vacuum on the other side of the rotor cylinder. Similarly as in the case of an airplane wing the vacuum is even more important than the pressure. For the rotor the vacuum is six or seven times the pressure.

"This difference of pressure acts along the whole length of the rotor at nearly right angles to the direction of the wind, and this is what propels the vessel. Now you will also understand the reason for having the end pieces or flanges. They prevent the normal air pressure from leaking into the vacuum zone.

"Always remember that the rotor in order to act in this way must be kept rotating from some source of power. This power required for the drive is less than 9 per cent of the power transmitted to the ship by the rotor. A rotorship as such needs no propeller and only a small engine to revolve the rotors. Since, however, it never was my intention to depend on wind alone and to build a pure sailing ship, every rotorship excepting pleasure yachts will have a main engine and propeller, the main engine being not much smaller than the one of a normal steamer or motorship. Such ships, in a dead calm, will travel at the same speed as a vessel with the usual engine power. When there is a fair breeze, the rotorship will travel faster than the ordinary vessel, due to the combination of propeller and rotor power. In strong winds it may use the rotor alone and still have greater speed than the ordinary steamers or motorships which lose their speed in the heavy sea kicked up by a high wind. The net result is that the *average* speed of the rotorship is higher than that of the ordinary vessel, and the fuel consumption considerably less.

Analysis of a Specific Case

"Let us assume a 10,000-ton ship that 3000 horsepower will drive at a speed of about 10 knots. Giving this ship 75 per cent of this engine power, or 2250-horsepower will only reduce the speed 10 to about 8½ or 9 knots. Now we add the rotors which in a strong wind will produce say 1500 to 2000-horsepower. If now, during only 50 per cent of the time, we use combined rotor and propeller power, the ship will have a speed of 11 or 11½ knots, 50 per cent of the time. In the other 50 per cent of the run the ship will only make 8½ or 9 knots, giving an overall average of 10 knots, the same as the ordinary ship with full engine power. It must not be forgotten, however, that on a long trip the ship with no rotors cannot keep up its normal speed on account of wind and sea conditions. Hence the rotorship with 75 per cent engine power will surpass the other one in average speed. The saving



ROTOR PRINCIPAL APPLIED TO A YACHT IN GERMANY. IN SEVERE WEATHER IT IS SAID TO BE SAFER AND FASTER THAN A SAILING YACHT

in fuel amounts to more than 25 per cent because, when propeller and rotor work together, the engine can often be throttled down.

"Part of tht cost of installation of the rotor is made up by the saving in the first cost of the engine, and the rest by the saving in fuel. In less than one year the total cost of the rotor installation should be saved.

"Additional advantages are greater safety, since the rotors are available in case of engine or propeller breakdown. The rotorship also is more stable in heavy weather, the wind bracing it the same as a sailing ship.

Deck Space not Reduced

"The deck space is not reduced by the rotors, because the rotors are mounted on the regular superstructures. On the 3000-ton ship BARBARA which was launched a few weeks ago, one rotor is mounted above the bridge, one on the superstructure midships, and the third on the afterdeck where the pivot does not obstruct at all. The BARBARA is 300 feet in length and has three rotors, 55 feet high and 13 feet in diameter. In this case we attacked the problem in a different manner. We gave the engine 1000-horsepower and the rotors will develop about 1200. Without rotors the ship is guaranteed to run 10 knots. The intention is to throttle the engine, when there is wind, and the result will be that this vessel with fuel will have a higher average speed. The two examples will show that any number of variations are possible to suit particular requirements.

Ship is not Top Heavy

"On account of the large dimensions of the rotor, people imagine that the rotorship must be top heavy. The fact is, however, that the weight of the rotors is only one tenth that of the sails, masts and tackle which they replace and that the center of gravity is lower. While the normal tackle including the sails on a 3000-ton sailing ship weighs more than 200 tons, the rotating part of one rotor on the 3000-ton BARBARA weighs only 1½ tons.

"No addition to the crew is required, when rotors are added to the equipment of a steam or motorship.

"The rotorship, of course, must occasionally tack to fully utilize the wind, but this lengthening of the distance traveled is much less than in the case of the ordinary sailing vessel, since the rotorship can sail twice as close to the wind as the sailship.

"For passenger liners I recommend the installation of small storm rotors which will help to maintain the regular speed in stormy weather, as long as the sea is not running too high. Comparatively small and inexpensive rotors may be mounted on existing vessels in order to increase the speed or to save fuel.

"I thank you for the opportunity you have given me to explain to an audience of men actively engaged in the shipping business, my plans which so often have been misinterpreted. I have brought over the BADEN-BADEN merely with the intention to demonstrate the practicability of the rotor principle. My remarks have shown that the BADEN-BADEN was not originally designed as an economical rotorship. She formerly was a sailing ship with a small auxiliary engine, now she is a rotorship with too small an engine. Furthermore the ship as such is too small to show good economy, since, when she gets a good wind, the sea is usually too strong to utilize it, the

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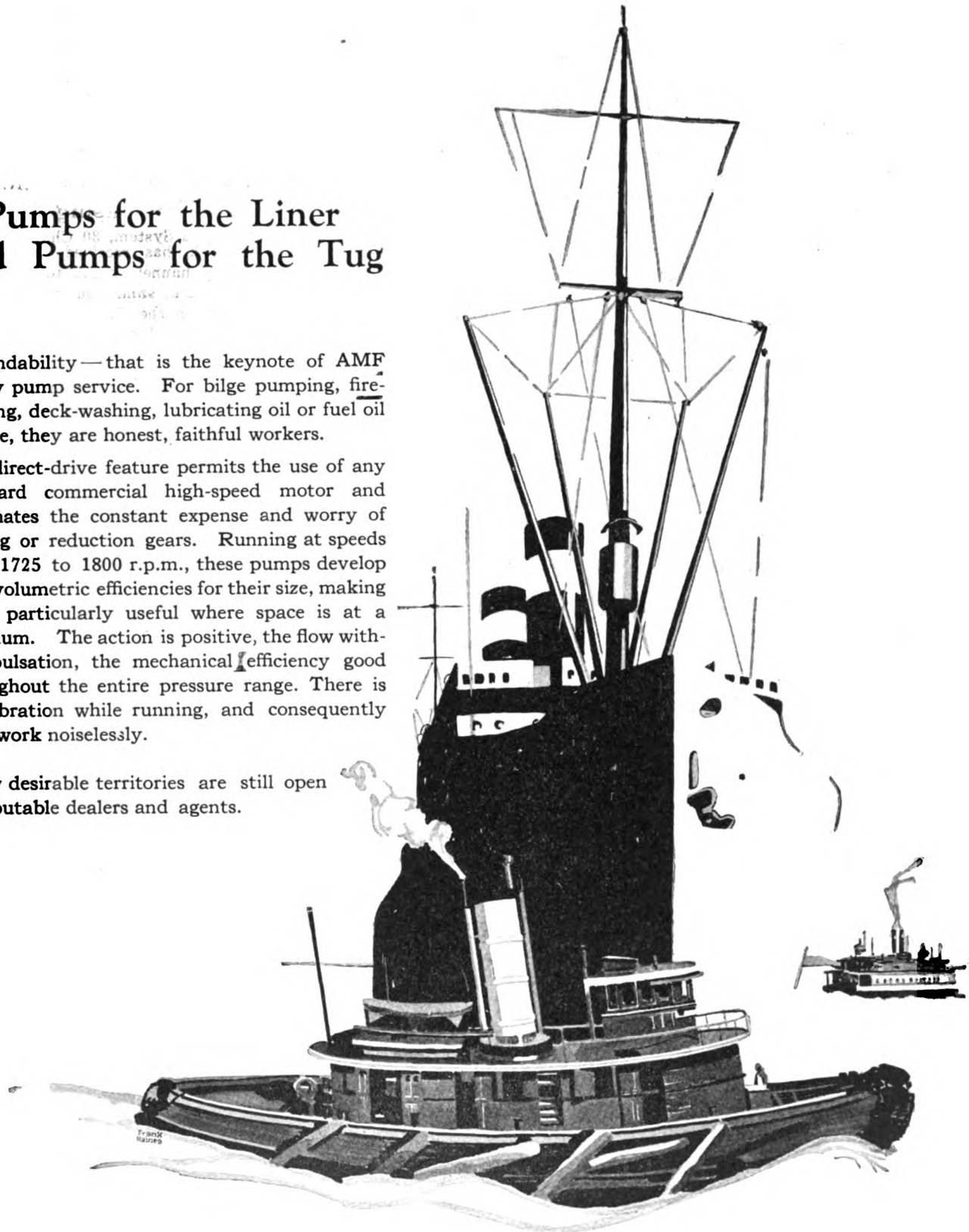
Dependability — that is the keynote of AMF rotary pump service. For bilge pumping, fire-fighting, deck-washing, lubricating oil or fuel oil service, they are honest, faithful workers.

The direct-drive feature permits the use of any standard commercial high-speed motor and eliminates the constant expense and worry of belting or reduction gears. Running at speeds from 1725 to 1800 r.p.m., these pumps develop high volumetric efficiencies for their size, making them particularly useful where space is at a premium. The action is positive, the flow without pulsation, the mechanical efficiency good throughout the entire pressure range. There is no vibration while running, and consequently they work noiselessly.

A few desirable territories are still open to reputable dealers and agents.



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small ship not being able to stand up against the sea.

"All I wanted to show with the BADEN-BADEN is that the rotor represents an ideal sailing device, in any sort of weather and under all conditions."

It is not the inventor's idea apparently to replace the highly developed normal ship engine, but rather to put in the hands of shipping men a simple and modern method of making wind power, which on the sea is available in billions of horsepower subservient to the needs of shipping, without great complications, without radical changes in design, without increasing the crew of a steamer or motorship. It is his idea that rotorships of the future will have powerful engines of the normal type so as to enable a vessel to cross windless zones without upsetting its schedule, and to supplement by the propeller the power derived from the rotors during periods of feeble winds. It is impossible to obtain the right combination with ordinary sails because the handling of great sails of a large vessel of say 15,000 tons, would require an excessively large crew. Another claim is that the rotorship can sail much closer to the wind than the ordinary sailing vessel, say 20 to 30 degrees as against 60 to 75. It, of course, requires practically no time to get full power from the rotor sail, whereas it would take many hours to set the sails of a large ship. The rotor may be used even in the worst kind of storm without endangering the ship. The stability conditions are only slightly affected by the rotors since the rotors made of aluminum would be only one-eighth the weight of mast, sails and tackle which they replace.

Details of the Baden-Baden

The BADEN-BADEN is 160 feet long, 36 feet in beam and has a draft of 11 feet. The height of the rotors is 50 feet above the deck and their diameter is 9 feet. The thickness of the rotor shell is slightly more than 1/32 of an inch. In an average wind the rotors revolve at 120 revolutions per minute and they are mounted on pivots of about 4 feet diameter. The outside of the rotors is perfectly smooth and they are closed at top and bottom. The flanges at the two ends increase their effectiveness by about 100 per cent. The rotors act merely as sails with the advantage that they produce 10 times the propulsive force of sails of the same area. The rotors are revolved by small individual electric motors controlled by the navigator on the bridge.

On April 28 a new and larger rotorship of 3000 tons christened the BARBARA was launched in Bremen. It is expected that this vessel will have a trial in July. She has been designed and built as a rotorship and is 300 feet long, has three rotors 12 feet in diameter and 55 feet high which will extract from the wind about 1200-horsepower. Only 30-horsepower will be necessary for the driving of each rotor. This new rotorship is under construction for the German government and has already been chartered by the Sloman Line. The fact that this vessel will immediately enter practical service indicates the confidence which some shipping men in Germany at least have in the new principle.

Facts About the Inventor

Anton Flettner was born in a small village near Frankfurt, Germany and comes from a family of shipowners who have for a long period of time been connected with navigation both inland and ocean. His father was one of the first shipowners to order steam tugs for river towing in place of horses. After completing primary and high school Flettner went to sea with the intention of becoming an officer in the merchant marine. He gave up this ambition, however, and after one and a half years at sea and a brief course at a seminary, he became a teacher of physics and mathematics in the technical high school. While still in high school he invented and patented a method for wireless distant control of ships or vehicles. At the outbreak of the war, being expert on these special subpects, he was called into the army aviation department where several of his inventions were developed and introduced by the army, among which was the remote control of the rudder for airplanes. At the end of the war Flettner applied his airplane rudder to merchant ships.

Powerful Dipper Dredge Diesel Electric

The first completely electrically equipped dipper dredge in the United States and the most powerful craft of its type in the world was launched April 22 at the Camden yards of the American Brown Boveri Electric Corp. Not a pound of coal will be used on the dredge which will have two diesel engine units generating a total of 1300 horsepower, applied through 25 motors.

The dredge will be delivered at Staten Island in about three weeks, to the Bucyrus Co. which designed it for the Great Lakes Dredge and Dock Co. It will be used on the Atlantic seaboard. It is capable of operating independently off shore for a period of six weeks since it evaporates its own water supply. It also is capable of operating either in salt or fresh water to depths of 50 feet.

Channel Construction Increasing

The Ellis System, 30 Church street, New York, has received new orders for steel channel barges for contracting work and sand and gravel transportation on the Great Lakes, in the Gulf and in South America. Seven barges have been ordered from the Raymond Concrete Pile Co. for use in contracting work on Lake Maricaibo in Venezuela to be built by the Atlantic Works, Boston; also barges for the use of the Edward N. Gillen Co., Milwaukee and for G. O. Reed, Inc., Michigan City, Ind., for use at Miami Beach, Fla.

The barge for G. O. Reed, Inc. will be one of the most completely equipped contractor's barge ever built. Every operation, either handing the barge itself or hoisting and hauling materials, will be under the control of one man operating 18 levers. This equipment is to be installed by the Lambert Hoisting Engine Co. There will be no ropes on deck, all ropes at deck being led into the hold and thence to the drum.

Sun Ship Gets Contract

The Sun Shipbuilding & Dry Dock Co., Chester, Pa., proved successful in some very close bidding, in getting the job to rebuild the tanker GULF OF VENEZUELA belonging to the Gulf Refining Co., and which was very badly wrecked by an explosion, at Port Arthur, Texas on April 11 last, when 21 men were burned to death. It was a gasoline explosion. The contract calls for rebuilding the ship as she was when new. The following companies bid the amounts indicated: Sun Shipbuilding & Dry Dock Co., $215,000; W. & A. Fletcher Co., $222,000; Tietjen & Lang, $252,000; Robins Dry Dock, $258,557, the two latter being plants of the Todd Shipyards Corp., Bethlehem Shipbuilding Corp., $275,000; Morse Dry Dock & Repair Co., $283,800; staten Island Shipbuilding Co., $300,000. The bids were opened on May 11, 1926.

Capt. William S. Samuels, 80, a former "clipper ship" captain, a director of the Philadelphia Maritime exchange and president of William S. Samuels & Sons, Lloyd's agents, died May 17.

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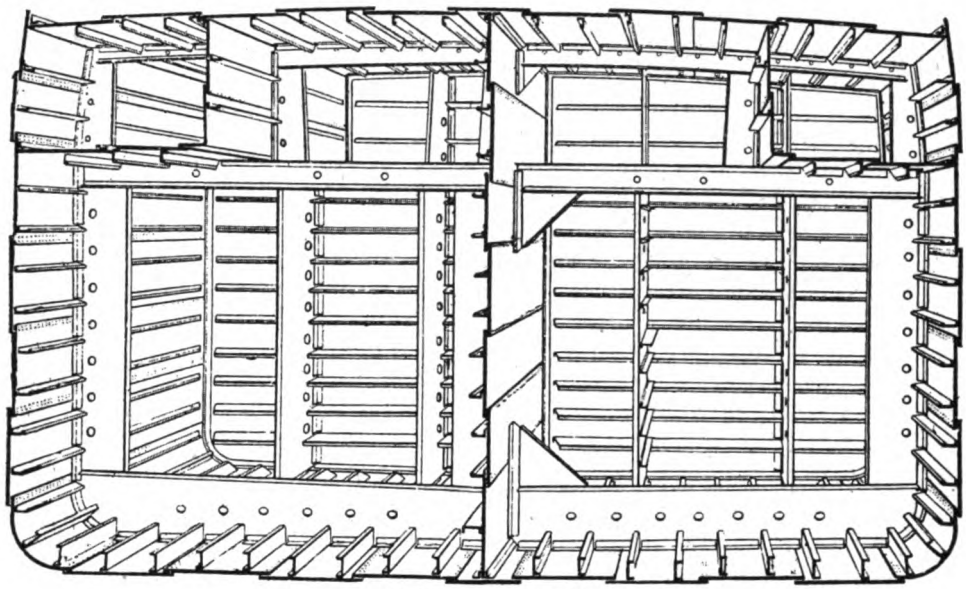

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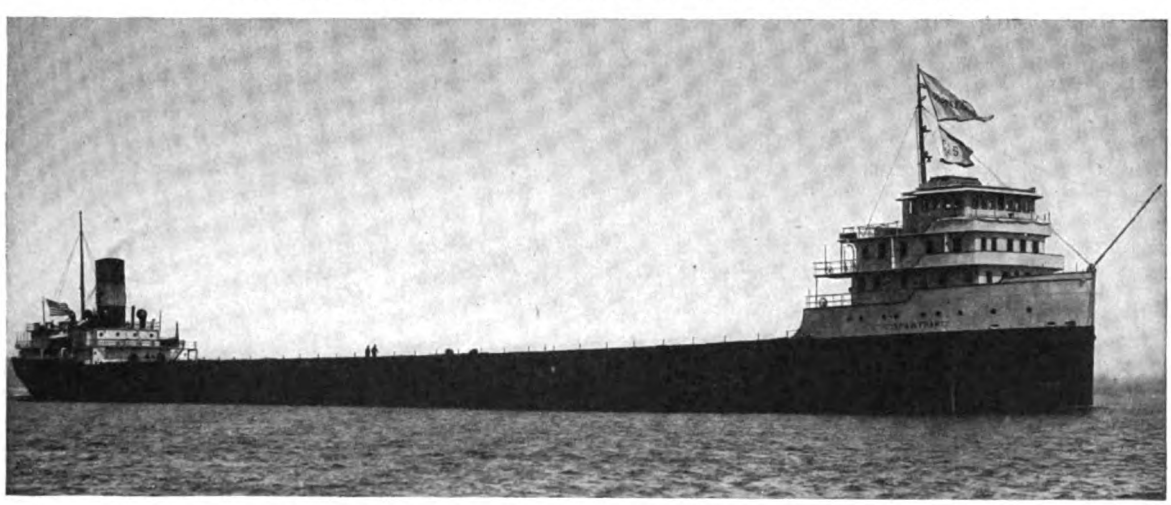

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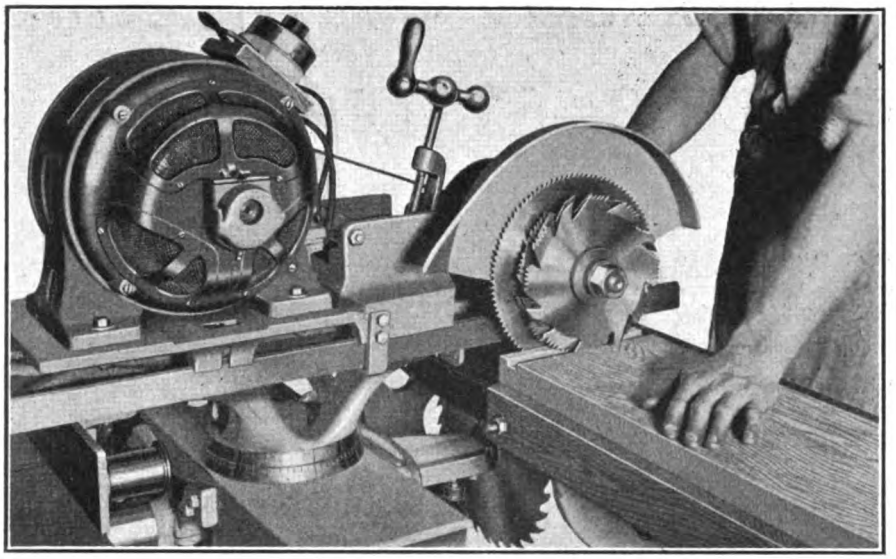


ROUTING AND CUTTING OFF A SIDE DOOR JAMB IN ONE OPERATION— MANY DIFFERENT OPERATIONS POSSIBLE WITH THIS MACHINE

Equipment, Afloat, Ashore

(*Continued from Page* 31)

head saw and at the same time protects the motor from dust.

A very complete catalog, published by the manufacturer of the machine describes and illustrates in detail the numerous different operations which are possible with it. Altogether it is a very interesting and practical machine which would undoubtedly prove most useful in any shop not fully equipped with special tools for carrying out all these different operations.

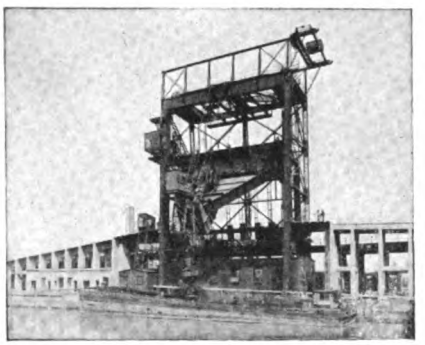
Philadelphia Has World's Largest Coal Dumper

A most important addition to the extensive facilities of the Reading company's 3800 mile railway system at Port Richmond, its Philadelphia harbor terminal, has been made during the past year with the installation of the world's largest coal car dumper. This piece of machinery, capable of handling forty 100-ton coal cars each hour, is located on Pier 18, Philadelphia harbor, and to a great extent is electrically operated, while all control apparatus is electrically actuated.

The Reading system serves all principal cities in Eastern Pennsylvania and connects with many trunk lines traversing the state. The huge new dumper operates to serve freighters with export coal, barges for coastwise trade, and smaller craft for direct delivery to the industries of the Port of Philadelphia.

Cars to be dumped are pulled up a 12 per cent grade to the dumper table, and are hoisted vertically to the hopper. A main operator stationed in a cab near the top of the machine has a clear view of the car as well as the ship into which it is to be emptied. From here the raising of the car is controlled, as well as the height of the pan into which the coal is to be dumped. The hoisting machinery is operated by steam, while the span is governed by a 150 horsepower Westinghouse electric motor.

At the end of the pan into which the coal is dumped there is a telescopic chute, with an operator to control its movement stationed in a cab directly over the ship's hatch, so that proper direction of the flow of coal can be obtained. The entire operation is controlled electrically and with surprising flexibility, which assures proper draft of the ship fore and aft. The pan and telescope mechanism is hoisted clear of receiving ships before and after docking by a 275 horsepower motor, protected with limit relays and full magnetic dynamic braking controller.



NEW LARGE CAPACITY COAL DUMPER AT THE READING RAILROAD TERMINAL PIER 18 PORT OF PHILADELPHIA

In connection with the car hoist, a large thawing house is maintained on the dock for winter weather. Four tracks pass through the building, having a total capacity of 48 cars. A temperature of 200 degrees Fahrenheit is maintained in extreme weather, which quickly thaws the coal for dumping into waiting barges or ships.

Steam equipment for the car hoist and thawing house was supplied by the McMyler Interstate Co., Bedford, Ohio, while electric motors and controlling equipment was manufactured by the Westinghouse Electric & Mfg. Co., Pittsburgh.

A New Marine Lubricant

There is a new form of lubricant for marine uses, known as Motor-Mica an antifriction compound, which it is claimed possesses unusual lubricating qualities. This substance is made in powdered form and is not to be confused with ordinary mica, with which many engineers have had experience in the past. It is scientifically compounded of various high-grade ingredients, under a secret formula and process.

It should be added to greases or lubricating oils, and it is not affected materially by either heat or cold, and can be used to advantage in place of graphites. It gives bearings a smooth, polished coating, thus reducing friction, heat, and the consumption of greases and oils. Lubrication costs, it is claimed, are lowered and power, increased.

This lubricant is high heat resisting, does not cake, gum, harden or dry up, and possesses a large factor of safety in maintaining a lubricating film such as is so desirable when turbines are started from rest. It is used for impermeating rod-packing and for hand and man-hole gaskets, and for any of the manifold purposes that the graphites are now employed in.

It is manufactured by Scientific Lubricants Co., 515 Harris Trust Bldg., Chicago. A report of a test at Armour Institute of Technology stated that: "The effect of Moter-Mica is to reduce materially both the friction and the temperature."

Gershom H. Wheeler, treasurer, director and general sales manager of the Brunswick Kroeschell Co., died on April 12. His loss will be seriously felt by his colleagues, as he was both able and well liked. For 17 years he had been one of the company's most sincere workers.

Boland & Cornelius have announced removal of their offices to Marine Trust building, Buffalo, N. Y.

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Shipping Board Status

(*Continued from Page* 30)

authority over the operation of the government-owned fleet to the president of the Fleet corporation. Cutting down of powers of the shipping board to those of a purely regulatory character also was recommended.

Contracts for the installation of diesel engines in six steel cargo ships have been signed by the shipping board. Four of the engines will be installed by the Newport News Shipbuilding & Drydock Co., and the other two by the Bethlehem Shipbuilding Corp. The amount of the six contracts aggregates $2,290,900. The engines to be installed by the Newport News yard were built by the Worthington Pump & Machinery Corp., at Buffalo, and the Busch Sulzer Bros. Diesel Engine Co., St. Louis. The Worthington type engines will be placed in the TAMPA and UNICOL cargo ships of 94000 deadweight tons, at a cost of $707,000. The Busch Sulzer engines will go into the SAWOCKLA and the CITY OF RAYVILLE, at a cost of $768,900. Engines made by McIntosh & Seymour, Auburn, N. Y., will be installed by the Bethlehem corporation in the WEST HONAKER and the WEST CUSSETA, cargo ships of 8600 deadweight tons, at a cost of $815,000.

Hearings have been held on the bill introduced by Senator Pepper, of Pennsylvania, providing for an indirect subsidy for the upbuilding of the American merchant marine, before the senate commerce committee. Chairman Jones, of the committee stated that the purpose of the hearings was to obtain information that would be useful in consideration of aid to the merchant marine, and that if supporters of this measure want to see legislation along this line in the next session of congress they should try to line up support from agricultural and labor organizations. Witnesses who appeared in support of the bill included representatives of the American Bureau of Shipping, the Atlantic Coast Shipbuilders association, Society of Naval Architects and Marine Engineers, shipbuilding firms, the Council of American Shipbuilders, the American Steamship Owners association and the Pacific American Steamship Owners association.

Diesel Drive for Tanker

The Oil Transport Co., Baltimore, Md., owners of the tanker TUXPANOIL, recently purchased from the Shipping board, will convert this vessel to diesel drive. The preparation of specifications and general supervision is in charge of Charles Ross, well-known marine surveyor of New York. This vessel is similar to the tankers LIO and BETTERTON. Two diesel engines of 4-cycle type as made by the Falk Mfg. Corp., will be installed. These engines will each be of approximately 1300 brake horsepower and they will deliver their power to the single shaft by means of single gear reduction, one engine on each side. It is expected that the ship will be ready in February 1927.

Protect Against Fire

(*Continued from Page* 29)

the wooden bulkhead, as shown in the accompanying sectional diagram. The larger of two municipal fire boats, the Deluge, had been in dry dock for a week at least and was located on the opposite side of the river, unavailable at the time of the fire. The Samson, a smaller fire tug, was moored at the Algiers dry dock directly opposite the fire, but also across the river. The wind was blowing six miles an hour from the southeast at the time the fire began.

After attending to some special duties such as "spotting" some particular cars of material, the watchman employed by the wharf contractors retired to the office built in the Julia street shed and after eating some lunch issued therefrom at about 10:45 p. m. and discovered a fire on the upper end of the Girod street shed, beneath the open decking, among the piles on the river side of the wooden bulkhead. He called to another watchman inside the closed gate of the Girod street shed to turn in an alarm. This second watchman traversed nearly the length of the Girod street shed to report to his roundsman, who in turn traversed about 800 feet to report to the harbor police operator who, after telephoning the Samson, telephoned the fire alarm office, which office telephoned the insurance patrol and engine No. 5 at Julia and Magazine streets at about 11:03 p. m.

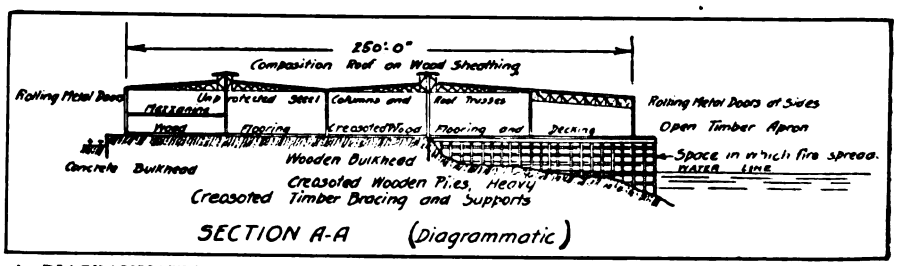
These companies responded promptly and the insurance patrol was able to attach a line of hose to a public hydrant in the roadway between the Julia and Girod street sheds, being forced to break open a hose house to get the hose. About the same time, firemen from engine No. 5 joined the insurance patrol crew with their own line from another hydrant farther removed. In the meantime, the officer in charge of engine No. 5 immediately caused the fire alarm box at Julia and Water streets to be pulled, which signal was received at the fire alarm office at 11:08 p. m. Four additional engine companies, one truck company, one chemical company, one tower company, one squad wagon, chief and first assistant engineer responded. A general alarm at 11.16, a repeated general alarm at 11:32 with three other calls for extra companies at 11:40, 11:48 and 11:53, brought out eleven additional engine companies, one other tower company, four hose companies, and a second water tower.

By this time, however, the blaze had gotten beneath the wooden flooring of the sheds and open wharf, igniting the piling and beams and joists, augmented by the wind that was blowing inshore and slightly downstream. A chimney effect beneath the flooring, caused both by the natural and induced drafts, greatly increased the temperature and caused a quick vaporization of the creosote impregnated in the wooden timbers, adding to the flames and causing them to burn through the wooden decking and get into the sheds above. The

Contributing Factors

Like most disasters the seriousness of this fire is chargeable to a number of factors, no one of which deserves the entire blame. The watchman was not efficient, the alarm was delayed, and the construction was such as to invite the spread of fire. Particularly striking is the contrast between the conditions found and the committee's recommendations of a maximum distance of 250 feet between fire walls in a wharf of this kind. The fire spread some thirteen hundred feet from its point of origin before reaching a fire wall and might have extended an additional thousand feet in the other direction.

Taken from an editorial in the January Quarterly of the National Fire Protection association.



A DIAGRAMMATIC CROSS SECTION AT A-A ON ACCOMPANYING PLAN VIEW OF THE PIER SHEDS DESTROYED BY FIRE

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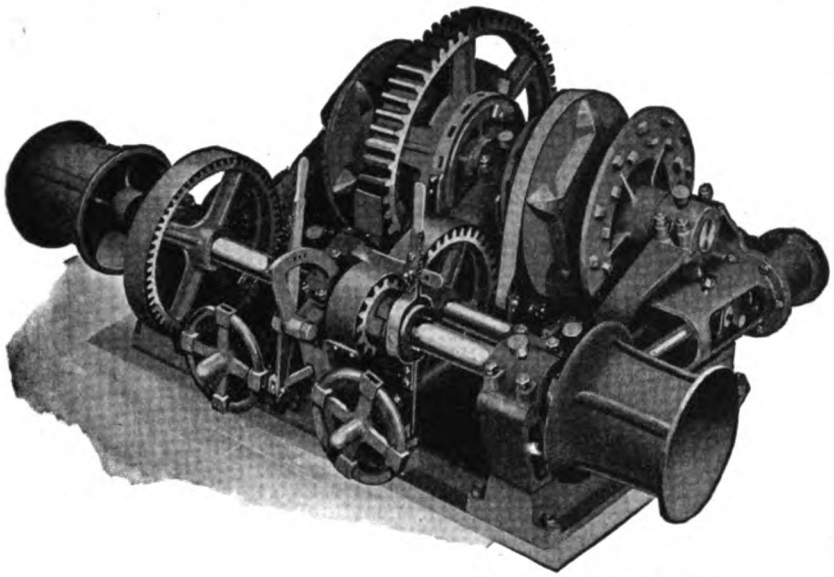
The "Superior" Spur Geared Windlass



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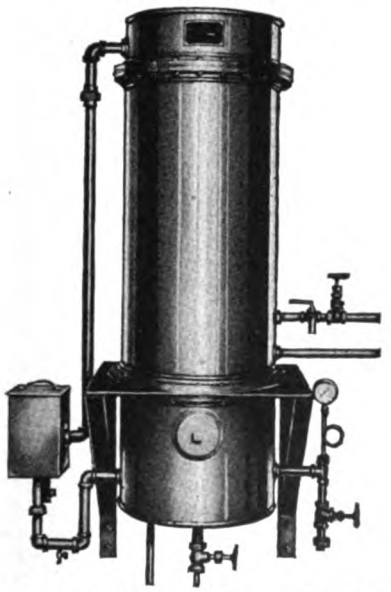

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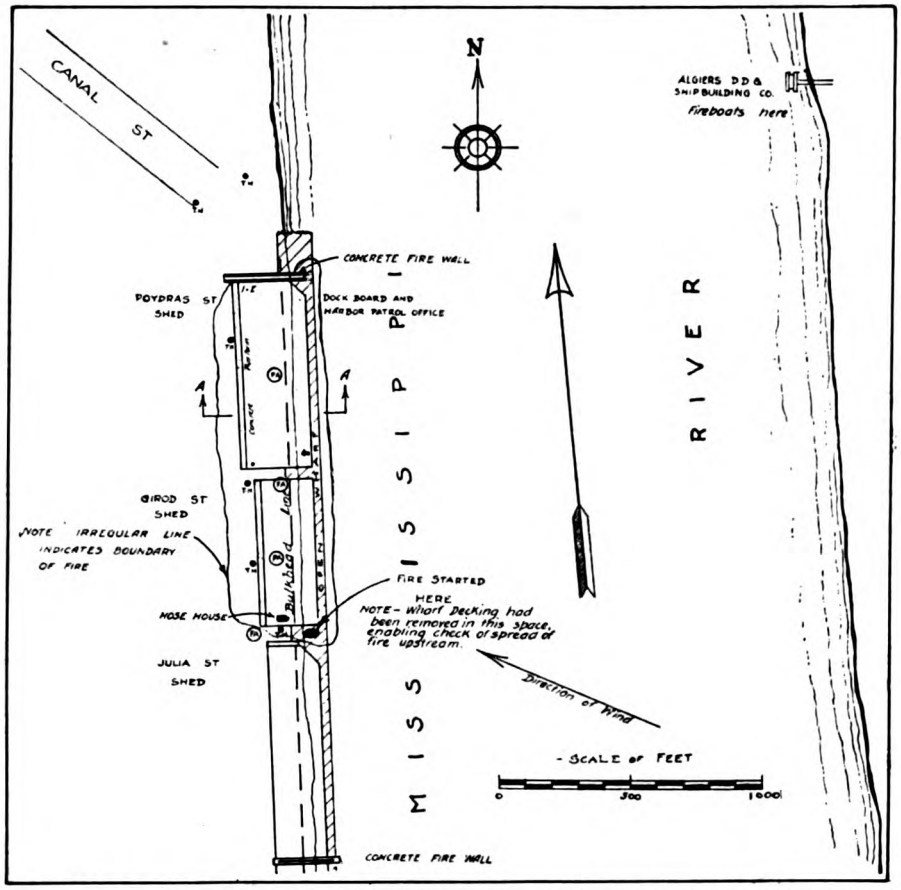


SKETCHES SHOWING LOCATION AND GENERAL ARRANGEMENT OF THE POYDRAS AND GIROD STREET SHEDS, NEW ORLEANS—THESE DOCKS WERE COMPLETLY DESTROYED BY FIRE NOV. 17, 1925

chimney effect within the sheds was greatly intensified by the closed side walls so that the fire spread with amazing rapidity, involving both structures within the space of about thirty minutes. The concrete wall on the lower end of the Poydras street shed, particularly that portion beneath the wharf, was instrumental in retarding the spread of the fire along and beneath the open wharf at the foot of Canal street.

Origin Not Definitely Known

The origin of the fire has not as yet been definitely determined. It was brought out in an investigation that an oil lantern had been used at times as a danger signal on the upper end of the Girod street wharf while the wharf was undergoing remodeling and repairs, but no evidence has been introduced to show that it had been used on the night of the fire. On the day of the fire an oxy-acetylene torch had been used by workmen employed by the contractors to cut or repair the steel members of the Julia street shed, but these men had quit at about 5:00 p.m.

This fire shows the importance of properly instructing watchmen, no matter by whom employed, in the use and location of fire equipment, and the advantage gained by a vigilant watch and patrol system under central station supervision with a sufficient personnel to cover properly and systematically the entire water front property at frequent intervals, day and night. Equally obvious from this fire is the fact that the telephone is not to be relied upon for the quick transmission of alarms. Boxes, though provided and very well spaced in this location, were not made conspicuous by red lights; it is probable that had they been, they would have been utilized, and regular box response been made at the beginning of the fire, before it got under the wharf. After this condition obtains, as has often been demonstrated, the fire department is powerless to extinguish a blaze of this kind, no matter how quickly men and apparatus respond.

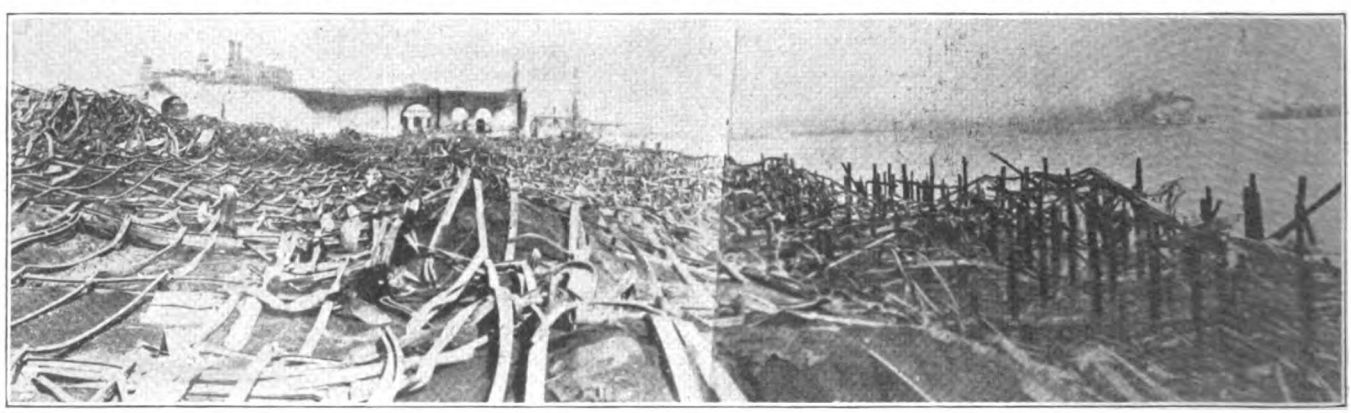
Type of Construction Important

The fire again illustrates the need for fire-resistive construction beneath the flooring of the sheds and wharves with frequent fire walls to break up the chimney effect that causes such intense heat and forces the fire to travel with such rapidity. This is demonstrated in the action of such a wall on the lower end of the Poydras street shed, where that portion of the ornamental facade beneath the wharf stopped the fire from spreading under the open wharf at the foot of Canal street.

The private equipment available was probably adequate to extinguish, or at least control, the fire in the beginning, but no use was made of it. The delay in sending in the alarm to the fire department was largely instrumental in allowing the fire to gain headway and finally sweep beneath the wharf. Another contributing factor to the delay in fire department operations was the blocking of the apparatus by freight cars at several points as engine crews endeavored to remove them.

Burning brands were carried a dis-

(*Continued on Page* 66)



DETAILS OF THE RUINS AT NEW ORLEANS SHOWING A TANGLED MASS OF STRUCTURAL STEEL AND CHARRED ENDS OF PILES —VIEW LOOKING NORTH SHOWING THE FIRE WALL WHICH FINALLY STOPPED THE PROGRESS OF THE FIRE

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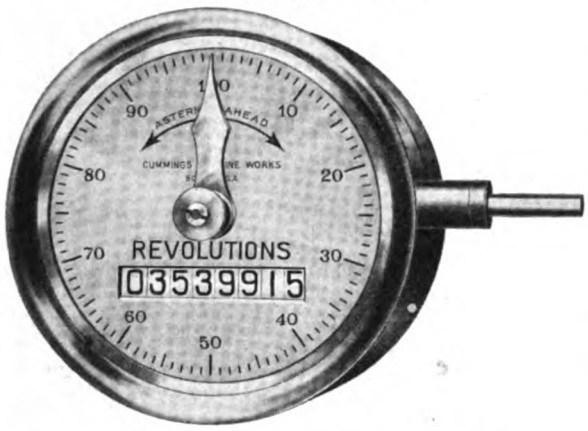

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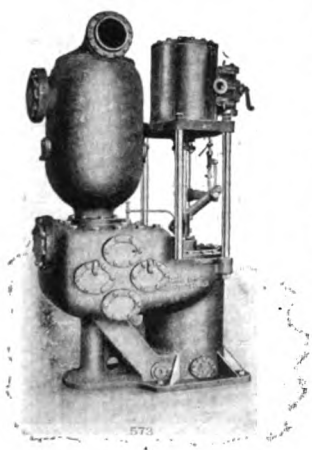

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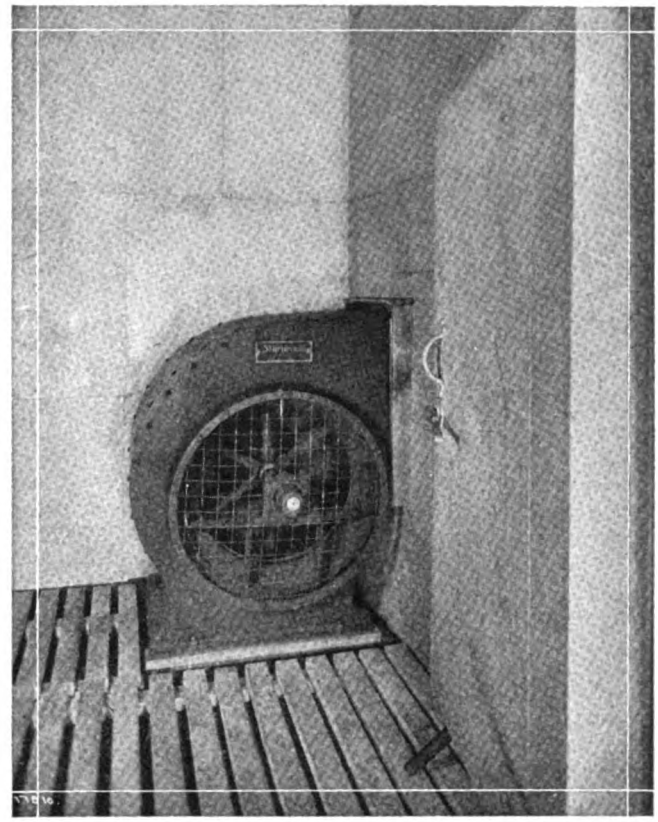

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Outlook for British Shipping *Is Now* Slightly Better

Shipbuilding Gains

British Shipping Faces Extreme Depression with Fortitude—Exports and Imports Drop From 1925 Level—Prospects Brighter Than at Beginning of Year—Freight Rates at Low Point—Shipbuilding Orders Increase Aided by Government Guarantees

BY VINCENT DELPORT
European Manager, Marine Review

EMERGING from a period of deep depression, British shipbuilding is showing signs of recovery. Without being unduly optimistic, certain experts forecast a slight but decisive improvement in the near future, although the fact that the tonnage under construction at the end of March 1926 was the lowest recorded since September 1909 is not particularly encouraging. The present improvement, slight as it may be, is thus recorded in Britain with exceptional interest. Shipowners, on the other hand, have experienced a bad time during the first quarter of the year as freight rates generally have been lower than at any time last year except in July. Both export and import values during the first two months of this year have decreased in comparison with those of the corresponding period of last year, the reduction being of slightly greater proportions for the exports. Hopes are being entertained that a general strike will be averted in the coal mines and that the industry will carry on without risk of disaster until adequate steps are taken to reorganize the collieries along the lines set out by the Royal coal commission. On the whole, the general outlook is somewhat brighter than at the beginning of the year and it looks as if the corner has been turned.

There have been discussions among shipowners in Scotland as to whether new tonnage should be ordered under present conditions, with a view to keeping the shipyards going, or whether, on the contrary, new building should be stopped altogether. The more favored opinion appears to be found between these two extremes, to the effect that old ships should be broken up and replaced by new tonnage of corresponding carrying capacity. Such discussions are of interest, inasmuch as they tend to show that there is no fixed policy being followed by British owners. In the meantime, contracts have been coming in, especially in February and March. Orders from America included a vessel for the Gulf Refining Co. of Philadelphia placed with Palmer's Shipbuilding Co., and two large twin-screw motor-vessels placed by W. R. Grace & Co. of New York with the Furness Shipbuilding Co. Among the more important domestic contracts are four motor cargo carriers of 10,000 tons each ordered by Furness, Withy & Co., five vessels of 2500 tons each ordered from Harland & Wolff of Belfast, and two motorships of 475 feet in length for the Dominion line placed with Swan, Hunter & Wigham Richardson Ltd., Vickers Ltd. of Barrow has also obtained contracts including one 20,000-ton Orient liner.

The Clyde shipyards, which have obtained the bulk of these new contracts, lost some liner orders which Italian shipowners have placed in their own country. However, owing to the amount of new work started in the months of February and March it is anticipated that the yards will offer employment for from 4000 to 5000 men for about a year and a half. It should be said that a certain amount of the work has been obtained with the assistance of the guarantees offered by the Trade facilities act. A sum of £1,280,000 ($6,200,000) is spread over 16 vessels under construction in five or six yards. It is also to be noted that out of the number of contracts placed in the Clyde district few are for vessels of ordinary cargo-carrying types, which fact does not represent great confidence in the freight markets; as a result, conditions are poorer in other shipbuilding districts which depend almost entirely on orders for cargo vessels.

The motor vessel continues to make considerable inroads into the field. While it is reported that the White

(*Continued on Page* 66)

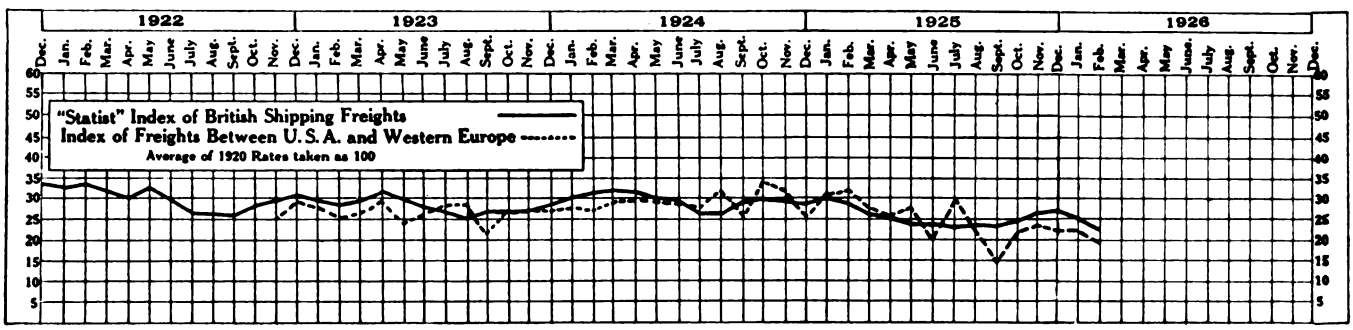

DIAGRAM SHOWING FLUCTUATION OF OCEAN FREIGHT RATES FOR FOUR YEARS AND TWO MONTHS

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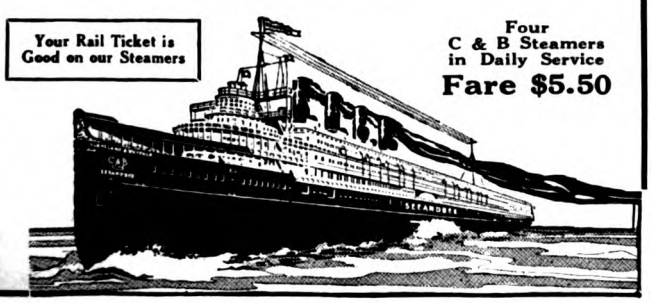

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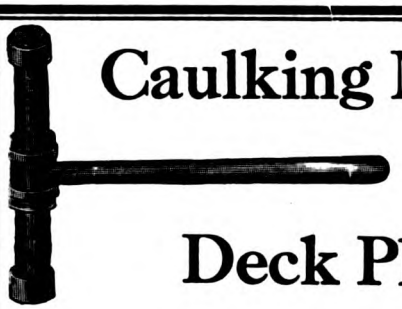

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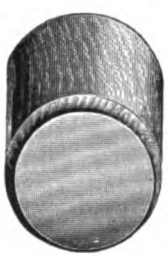

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Late Decisions in Maritime Law

Legal Tips for Shipowners and Officers

Specially Compiled for Marine Review
By Harry Bowne Skillman
Attorney at Law

THREE barges, comprising a tow anchored in a dense fog, did not comply with inland rules, art. 15 (d), providing that a vessel when at anchor shall, at intervals of not more than one minute, ring the bell rapidly for about 5 seconds, where each of such barges sounded her fog bell once every three minutes.—COHOCTON, 299 *Federal Reporter* 316.

* * *

A TUG, which came into collision with a barge anchored on anchorage ground in a fog, while moving at a speed which rendered it impossible to stop within the distance another vessel could be seen, was not exonerated from liability because the barge was also in fault for not ringing a lawful bell.—WALTER FRANKS, 299 *Federal Reporter* 319.

* * *

THE statutory duty to mark the wreck of a sunken vessel rests only on the owner of the sunken craft.—R. J. MORAN, 299 *Federal Reporter* 500.

* * *

THE fact that there is a mortgage, and not a prefered mortgage, on a ship, does not prevent or limit the right of the owner or agents to pledge the credit of the vessel by incurring a maritime lien, and that there had been a purchase agreement or contract for sale excuted between the United States and the original purchaser of the vessel did not affect the right of the furnisher of coal to a lien, where it was not shown that the claimant ever saw or even knew of the agreement.—BUCKHANNON, 299 *Federal Reporter* 519.

* * *

THE duty is imposed on one in possession and control of a pier to exercise reasonable care to keep it in repair for lawful use by persons lawfully there. One of the chief purposes of a pier, said the court in the case of Harvey v. Old Dominion Steamship Co., 299 *Federal Reporter* 549, is for unloading vessels, and there is an implied license to men engaged in unloading vessels which are moored to enter and occupy the piers built into and lying adjacent to the waters of the moored vessel.

* * *

IF A vessel goes to dry dock for repairs after a collision, and, while there, the owner makes additional repairs, which require more time than that necessary for the collision repairs, is the owner entitled to demurrage?" This question was asked in the case of BOUKER No. 3, 299 *Federal Reporter* 608, and was answered in the affirmative, the court saying that it seems reasonable that the owners should not be penalized because they concluded to take advantage of the condition for which they were not responsible and make additional repairs at a time when they would not have been made, except for the accident.

* * *

A VESSEL which has signaled by two blasts that she intends passing to starboard instead of to port, and gets no assenting response, is in duty bound to stop, reverse, and, if necessary, come to a standstill, until the course of the other vessel has been ascertained with certainty, and the risk of collision removed."—MUNAIRES, 1 F. (2d) 13.

* * *

ALL goods shipped by the charterers of a vessel themselves, in the absence of any special agreement modifying or supplementing the charter party, it was said in the case of ALBERT F. PAUL, 1 F.(2d) 16, would be subject to a lien for the chartered freight. So far as the charterers' liability is concerned, the issuance of a bill of lading is immaterial. It was further held in this case that freight cannot be due from charterers on a charter party until they have had the full user of the ship for the purposes for which they chartered it. The transaction, it was said, is analogous to the demise of property until the given purpose is answered. Therefore there is no general principle giving the master or owner any supervision or control over freight charges until the time comes for payment of charter hire.

* * *

IN THE absence of any express agreement to the contrary, or facts from which it would be implied, a general agent does not have a maritime lien for advances and disbursements which he makes in behalf of vessels belonging to his principal during his agency. The agent, it was said in the case of the WEST IRMO, 1 F(2d) 87, is presumed to rely on the credit of the owner and not the vessel. This presumption may be rebutted and overcome, but to overcome it, the agent must affirmatively prove the existence of an express agreement giving him a lien or such circumstances as justify the implication of one.

* * *

TUGS which have long tows in tidewaters must see to it that they control their tows sufficiently to prevent them from doing harm to other vessels; a tug with barges in tow on a 100-fathom hawser, thereby greatly increasing risk of navigating in a narrow tidewater channel, is bound to exercise a very high degree of care, and was liable for failure to control the tow and permitting it to swing across the bow of a steamship, resulting in a collision.—FRED B. DALZELL, JR., 1 F(2d) 259.

* * *

WHERE original bills of lading are signed by the ship's master and delivered to a subcharterer, or where the master by letter to the shipper ratifies the act of the subcharterer in signing bills of lading, which make no reference to the charter party, the ship is bound, though a different rule applies wherever subcharterer, after signing and delivery to the shipper of the bill of lading, induces the master to sign a further bill of lading, for its own rather than the shipper's protection; the master's casual looking at bills of lading issued by the subcharterer and his statement that they were "all right" is not a ratification of the subcharterer's acts in issuing same, by which the vessel is bound.—CAPITAINE FAURE, 1 F. (2d) 406.

* * *

WHERE a ship has not broken ground and commenced the voyage, she is not liable for failure to carry cargo discharged on default of charterer in payment of charter hire, except as to that portion of the cargo covered by the original bills of lading, or by bills of lading issued by the charterer and ratified by letter of the ship's master, though the ship was liable for proper storage of cargo and for loss or damage occasioned in discharging.—CAPITAINE FAURE, 1 F. (2d) 406.

* * *

A HALF owner of a vessel, it was held in the case of MORNING STAR, 1 F.(2d) 410, may not assert a lien against the vessel for services as master and mechanic as against the unpaid wages of the seamen. It was further held that one asserting a lien against a vessel for services as pilot was not entitled to a lien for the period when the vessel was laid up and he acted only as watchman or shipkeeper. Seaman, it was also held, was entitled to double pay as penalty, but not as against other lien claimants for a period prior to filing of libel, where without excuse he delayed assertion of his claim and demand for double pay.

* * *

WHERE contract of carriage arose before a bill of lading issued, the latter, it was decided in the case of MAR MEDITERRANEO, 1 F.(2d) 459, is merely a receipt for the goods to be transported.

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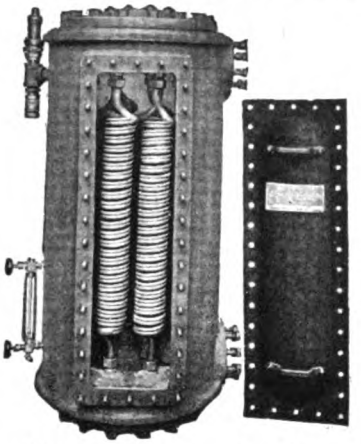
Look into the Reilly Heater



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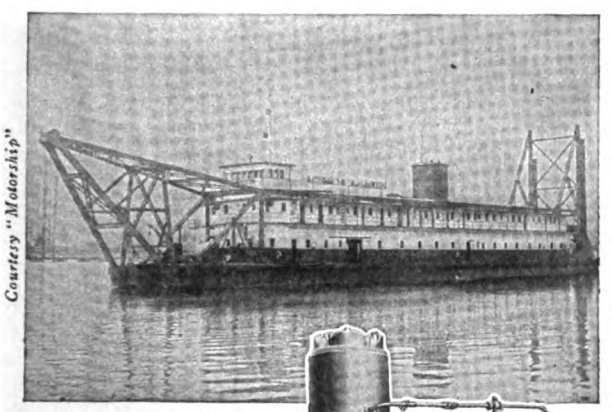

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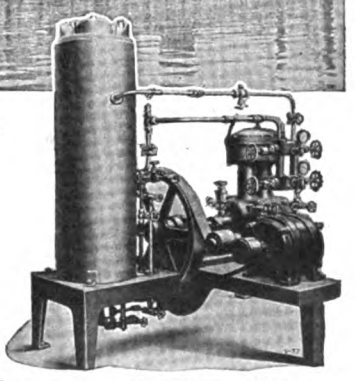

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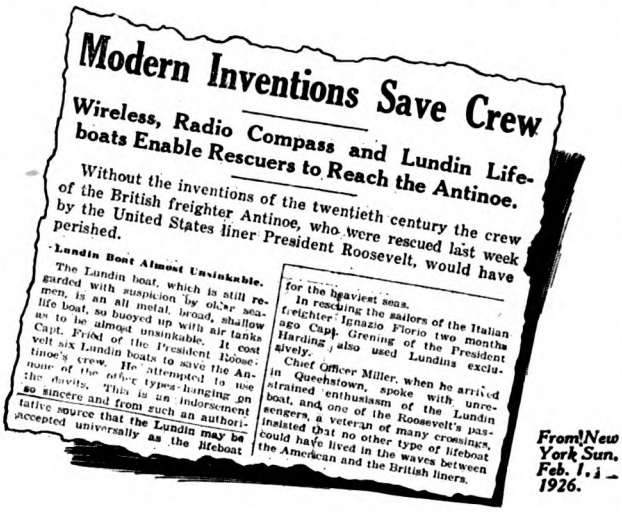

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Wireless, Radio Compass and Lundin Lifeboats Enable Rescuers to Reach the Antinoe.

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Lundin Boat Almost Unsinkable.

The Lundin boat, which is still regarded with suspicion by other seamen, is an all metal, broad, shallow life boat, so buoyed up with air tanks as to be almost unsinkable. It cost Capt. Fried of the President Roosevelt six Lundin boats to save the Antinoe's crew. He attempted to use none of the other types hanging on the davits. This is an indorsement so sincere and from such an authoritative source that the Lundin may be accepted universally as the lifeboat for the heaviest seas.

In rescuing the sailors of the Italian freighter Ignazio Florio two months ago Capt. Grening of the President Harding also used Lundins exclusively.

Chief Officer Miller, who he arrived in Queenstown, spoke with unrestrained enthusiasm of the Lundin boat, and one of the Roosevelt's passengers, a veteran of many crossings, insisted that no other type of lifeboat could have lived in the waves between the American and the British liners.

From New York Sun. Feb. 1, 1926.

"THE Lundin boat is an all metal, broad, shallow lifeboat, so buoyed up with air tanks as to be almost unsinkable. Capt. Fried of the President Roosevelt attempted to use none of the other lifeboats hanging on the davits and without the LUNDIN LIFEBOATS, an innovation of the last decade, Capt. Fried might have been forced to stand powerless on the bridge and watch the freighter go down with all hands.

This is a sincere and authoritative endorsement that the "Lundin" may be accepted universally as the lifeboat for the heaviest seas.

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Protect Against Fire

(*Continued from Page* 60)

tance of about six or eight blocks into the congested district where a potential conflagration was averted by incombustible roof coverings. Also, had not the decking beneath the Julia and Girod street sheds been removed at the time, thereby breaking up the draft conditions, the fire could have spread up stream to adjacent wharves, even in the face of the slight wind that was blowing at the time.

It has practically been decided in rebuilding these burned sheds and wharves to adopt superior construction. The sub-structure of docks and flooring of the wharves where overhanging the levee will be constructed of steel columns. Girders and sway bracing will be fastened to concrete caps and struts will rest on wooden pilings, the tops of which wil be cutoff below extreme low water. Flooring, bulkhead and the wharf above will be of reinforced concrete slab construction. Sheds will be of the usual one-story type, tar and gravel roof on wood sheathing, this in turn on unprotected roof trusses, supported by unprotected steel columns. In addition the sheds will be divided into two sections by a reinforced concrete fire wall, with approved automatic double fire doors on all openings. This wall will be located on the proposed Girod street shed as nearly equidistant as conditions will permit, between the lower end of the Poydras street shed and the fire wall in the Julia street shed. Fire alarm telegraph service will be replaced in practically the same locations. No present enlargement of the personnel of the harbor patrol is contemplated.

British Shipping

(*Continued from Page* 62)

Star line plans to contract for a 60,000-ton motor liner to be built by Harland & Wolff, substantial although less spectacular orders have been received of late, including one 20,000-ton motorship for passenger and mail service to New Zealand, via the Panama canal, placed by Shaw, Savill & Co., London, with Swan, Hunter & Wigham Richardson, Ltd., and three passenger motorships of about 3800 tons deadweight each placed with William Beardmore & Co., Ltd., by a Rio de Janeiro navigation company. Harland and Wolff launched at Belfast the first 20,000-ton motorship ordered by the Union Castle line. From the standpoint of engine construction there is keen competition between builders of single-acting and double-acting engines where high power output is concerned.

The balance sheet of Harland & Wolff, Ltd., of Belfast, Ireland, shows a balance at the credit of the profit and loss account of £135,469 7s 7d ($650,000) after providing for depreciation, writing off the balance of expenses of issue of first preference shares and payment of the dividend of 6 per cent on the first preference shares. This balance has been carried forward. The firm is one of the few shipbuilding concerns in Great Britain which have been kept pretty busy all through the year 1925.

Loyd's Shipbuilding Returns

Lloyd's Register shipbuilding returns show that for the quarter ended March 31 the tonnage under construction in Great Britain and Ireland was 843,070 tons, or nearly 42,000 tons less than at the end of December 1925, and about 322,000 tons less than the tonnage building twelve months ago. The tonnage on which work was suspended at the end of March 1926 amounted to nearly 80,000 tons, as compared with 74,000 tons at the end of March 1925. The present totals are 1,047,000 tons below the average tonnage building during the twelve months immediately preceding the war. However, an appreciable increase is shown in the tonnage commenced during the quarter, namely 193,121 tons, as compared with 160,986 tons during the fourth quarter of 1925, but the tonnage launched during the quarter under review was 190,705 tons, or 25,776 tons lower than for the previous three months. There are, at the present time, under construction in Great Britain and Ireland 11 vessels of between 10,000 and 20,000 tons each, and three of over 20,000 tons. The tonnage of motorships building at the end of March in Great Britain and Ireland was 289,664 tons amounting to 52.7 per cent of the steam tonnage under construction.

Shipowners have experienced a dismal time since the beginning of the year and, according to recent reports, the only shipping companies able to pay respectable dividends of the ordinary shares are those which have large investments outside the industry. Rates have been fluctuating, but with a general tendency toward low figures. At the beginning of February there was a general strengthening of outward chartering markets, especially to west Italy and the Near East. On the other hand, there was a slump of homeward freights in every market; rates in the River Plate market were the lowest ever recorded for February loading, 13s ($3.15) having been accepted from up and down river to the United Kingdom or the continent. Owners have gone as far as agreeing linseed as wheat, that is, getting no additional freight for linseed, whereas the standard additional rate used to be 2s 6d ($0.60) per ton.

Conditions were better at the end of March and advances of from 5s to 6s ($1.21 to $1.46) a ton were registered. Should there be an increase of the demand for grain there would, no doubt, be a good demand for tonnage, as considerable stocks are reported to be available for shipment from Argentina. At the time of writing the Plate market is firm, but outward coal rates to South America are low. Homeward rates for grain from the United States are as low as 1s 7½d ($0.38) from Portland, Me. to Hull. From Cuba the low rate of 13s ($3.15) has been accepted for a boat of 6000 tons for April loading. In the Mediterranean, ore rates are comparatively firm. The Eastern market is dull. A glance at the accompanying chart of index numbers of shipping freights shows the downward tendency since December 1925 when the index was 26.9; in January 1926 it dropped to 25.0 and a further drop to 23.0 was registered in February, against 28.8 in February 1925. In view of the depressed conditions of the market it is of interest to note that the firm of Furness, Withy & Co. have just announced a dividend of 5 per cent per annum on the ordinary shares. The profits for 1925 were £528,742 ($2,500,000).

Panama Canal Traffic Equals Best Record

During March, 1926, 506 commercial vessels passed through the Panama canal. Twelve small launches under 20 tons, and 89 vessels belonging to or chartered by the United States government also transited the canal. There were two transits solely for repairs on which no tolls were collected, making the total transits for the months 609.

Tolls on the 506 commercial vessels amounted to $2,206,212.20. The number of commercial transits was the same as for the record month of December, 1923. When 506 commercial vessels transited the canal, paying $2,335,729.81 in tolls. During January 1924, 476 commercial vessels transited the canal paying $2,216,855.01. With these two exceptions, the month of March this year was the highest in tolls collection since the opening of the canal to traffic.

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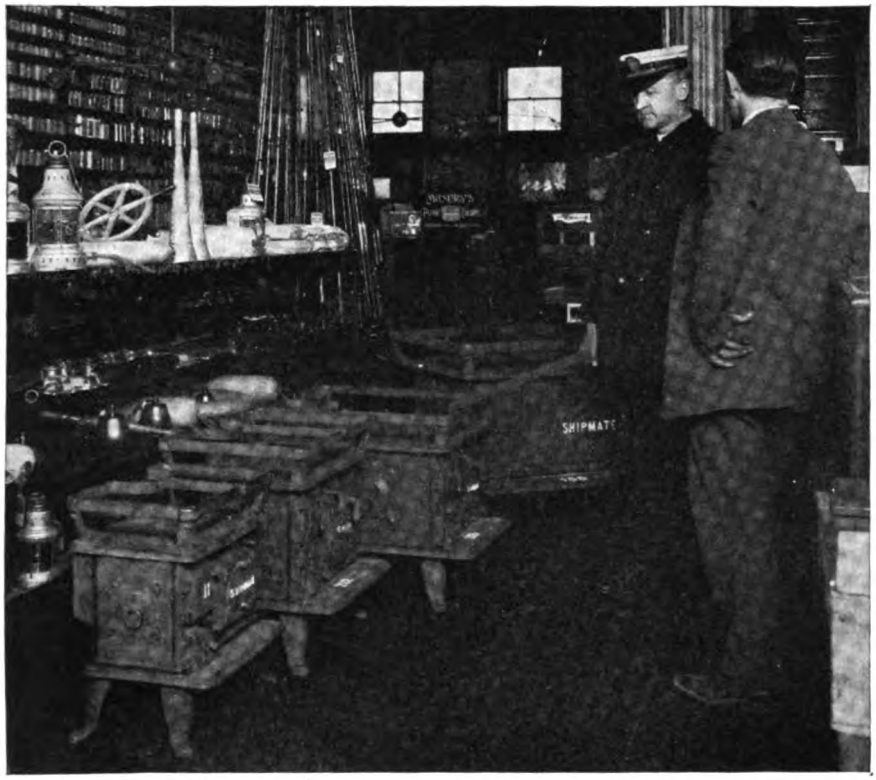


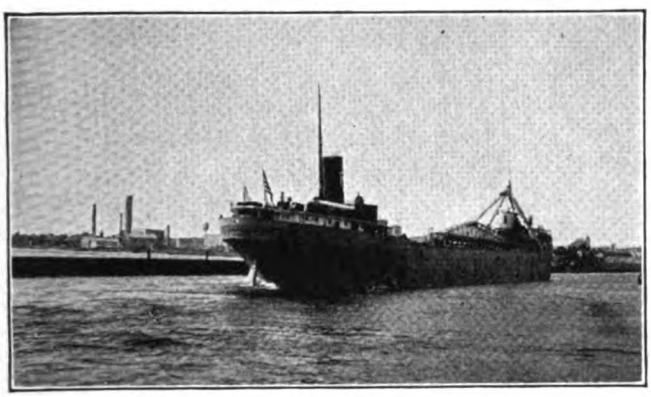
CAPTAIN: Did the makers of SHIPMATE ranges raise the price when they put on flat rails and rolling bars?

SALESMAN: No, No! They never add anything to the price for improvements; they count on the increased sales to return the costs to them.

SHIPMATES are made only by—

THE STAMFORD FOUNDRY COMPANY

Established 1830 STAMFORD, CONN.



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—on your next boat. We are equipped to design and build steel passenger boats, freighters, car-ferries, self unloaders, sand suckers, dredges, lighters, tugs, fireboats, dump scows, marine engine and boilers, ship auxiliary machinery.

Our engineers will gladly consult with you on your requirements. You will not be obligated.

MANITOWOC SHIPBUILDING CORP.
Manitowoc, Wisconsin

MANITOWOC

DROP FORGED WELDLESS

EYE BOLTS

ROLLED THREAD
GALVANIZED OR PLAIN

½"	DIAM.	WITH	EYE	⅞"	INSIDE
⅝"	"	"	"	⅞"	"
¾"	"	"	"	1⅜"	"
1"	"	"	"	1½"	"

QUICK SHIPMENT

OLIVER IRON AND STEEL CORP.
1001 MURIEL ST.
PITTSBURGH, PA.

ESTABLISHED 1863

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MAJ. RUFUS W. PUTNAM, for five years federal engineer at Chicago, has resigned from the army as of July 1 to become affiliated with the Commerical club of Chicago and to lay out a comprehensive harbor plan. Land, air and water traffic will be surveyed and an effort made to co-ordinate terminal facilities, with emphasis upon the probable furture trade to the south when the Lakes-to-Gulf waterway becomes a reality.

* * *

THE MICHIGAN TRANSIT CO. has put its steamers on their usual spring schedule. A steamer leaving at 6 p. m. on Wednesdays makes ports from Ludington to Harbor Springs, inclusive, and at 6 p. m. on Saturdays touching at Ludington to Mackinac, inclusive.

* * *

WHEN six steamers left Chicago, May 1, with cargoes of corn and oats for Buffalo they inaugurated the Lake Michigan grain trade for 1926 three weeks later than last year. The HARVESTER, of the Wisconsin Steel Co., was the first steamer to leave Chicago district ports, sailing April 24 light for Superior. The WILLIAM K. FIELD, of the Reiss Steamship Co., was the first steamer of the season through the Straits of Mackinac, April 26.

* * *

ALL vessel owners keep close track of the water levels and take advantage of every high stage to load their boats to greater drafts.

* * *

THE average loss caused by a reduction of one-third of a foot amounts to $44.57 for one trip of a bulk freighter on the upper lakes, or $590,000 a year for the whole fleet which moves over 100,000,000 tons.

Ocean Freight Rates

Per 100 Pounds Unless Otherwise Stated

Quotations Corrected to May 19, 1926 on Future Loadings

NOTE: FREIGHT RATES STEADY WITH BUSINESS FAIR

New York to	Grain	Provisions	Cotton (H. D.)	Flour	General cargo cu. ft.	General cargo 100 lbs.	††Finished steel	REMARKS Freight Offered
Liverpool	2s 3d	$0.50	$0.30	0.20	$0.40	$0.75	$7.00T	Light
London	2s 3d‡	0.50	....	0.20	0.40	0.75	7.00T	Light
Oslo	$0.13	0.45	0.50	0.27	0.42½	0.85	7.00T	Very good
Copenhagen	0.13	0.45	0.40	0.26	0.42½	0.85	7.00T	Very good
Hamburg	0.10	0.35	0.40	0.18	0.37½	0.75	8.00T	Fair
Bremen	0.10	0.35	0.40	0.18	0.37½	0.75	8.00T	Fair
Rotterdam and Amsterdam	0.12	0.32½	0.45	0.18	0.35	0.70	7.50T	Fair
Antwerp	0.11	0.32½	0.35	0.18	0.35	0.70	7.50T	Fair
Havre	0.10	0.50	0.35	0.27½	0.40	0.75	8.00T	Very slow
Bordeaux	0.10	0.50	0.35	0.27½	0.40	0.75	8.00T	Very slow
Barcelona	....	12.00T	0.30	10.00	—12.00T—		8.00 to 15.00T	Fair
Lisbon	0.20	0.65	0.40	7.00T	—20.00T—		7.00T	Slow
Marseilles	0.15	0.55	0.30	6.00	—20.00T—		5.00T	Slow
Genoa	0.17	12.50	0.40	7.00	—20.00T—		10.00T	Fair
Naples	0.17	12.50	0.40	7.00	—20.00T—		10.00T	Fair
Constantinople	0.27	17.00T	0.75	0.40	—20.00T—		9.00T	Fair
Alexandria	....	17.00T	0.75	0.40	—20.00T—		9.00T	Fair
Algiers	....	0.75	0.50	0.40	—20.00T—		10.00T	Poor
Dakar	....	15.00	....	14.00T	—21.00T—		10.50T	Fair
Capetown	9.00T	18.00	....	13.00T	—20.00T—		11.00 to 18.00T	Very good
Buenos Aires	....	20.00T	....	....	—20.00T†		8.00T	Very good
**Rio de Janeiro	....	22.00T	....	8.00T	20.00 to 22.00T†		7.00 to 7.70T†	Very good
Pernambuco	....	22.00T	....	9.00T	—22.00T—†		9.70T†	Very good
Havana	0.22½*	0.50	....	0.22½*	0.61*	1.33*	4.00*	Fair
Vera Cruz	0.35	0.30	0.35	0.25	0.52½	1.05	0.30 to 0.35	Fair
Valparaiso	....	1.07	....	0.70	0.45	0.80	10.00T	Very good
San Francisco	....	0.40 to 0.70	....	0.50 to 1.10	....	....	0.30 to 1.00	Fair
Sydney	....	18.00T	1.25	1.18T	18.00-24.00T		9.00-12.00T	Fair
Calcutta	....	....	0.45	10.00T	—16.00T—		10.00T	Fair

T—Ton. ‡Per quarter of 480 lbs. †Landed. ††Heavy products limited in length. *Extra charge for wharfage. **Plus $1.00 surcharge on all rates to Rio de Janeiro on account of congestion.

From North Pacific Ports to	Lumber Per m. f.
San Francisco	$5.00
South California	5.00 to 6.00
Hawaiian Islands	9.50 to 12.00
New Zealand	17.00 to 18.00
Sydney	13.00 to 13.50
Melbourne-Adelaide	13.50 to 14.00
Oriental Ports	8.50 to 10.00
Oriental Ports (logs)	12.50 to 14.00
Peru-Chile	12.50 to 14.00
South Africa	17.00 to 18.00
Cuba	16.00
United Kingdom	75s to 90s
United Kingdom (ties)	70s to 80s
Baltimore-Boston range	$14.00 to 15.00
Florida Range	No rates
Buenos Aires	14.00

	Flour and Wheat
U. K. and Continent (gross ton)	25s to 30s
Oriental Ports (net tons)	$4.00 to 4.50

Principal Rates To and From United Kingdom

	s	d
Grain, River Plate to United Kingdom	18	3
Coal, South Wales to Near East	11	0
Coal, United Kingdom to Buenos Aires	16	3
Manganese Ore, Poti to Philadelphia	$3.85	
Pig iron, United Kingdom to New York or Philadelphia	9	6
Iron ore, Bilbao to Cardiff	6	0
Iron ore, Huelva to Phila. or Balto	12	6

NOTE: Lighterage rates on fuel in New York reduced from 6½ to 5½c per barrel.

Bunker Prices

At New York

	Coal alongside per ton	Fuel oil alongside per barrel	Diesel engine oil alongside per gallon
July 20, 1925	4.90@6.00	1.75	5.50c
Aug. 17	5.00@6.00	1.71½	5.50
Sept. 19	5.50@6.00	1.71½	5.00
Oct. 17	5.00@6.00	1.70½	5.00
Nov. 18	5.50@5.60	1.70½	5.00
Dec. 18	5.60	1.70½	5.00
Jan. 2	5.50@6.25	1.75@1.80	5.25
Mar. 18	5.60@5.80	1.80½	5.50
Apr. 22	5.25@5.60	1.80@1.81½	5.75
May 19, 1926	5.25@5.60	1.80½	5.88

At Philadelphia

	Coal trim. in bunk per ton	Fuel oil alongside per barrel	Diesel Eng. oil alongside per gallon
Aug. 17, 1925	5.00@5.80	1.56@1.71½	5.15@5.29c
Sept. 19	5.25@5.50	1.55@1.61½	5.00
Oct. 17	5.25@5.50	1.71½@1.74½	5.15@5.65
Nov. 18	5.40@5.65	1.71½@1.74½	5.15@5.25
Dec. 18	5.15@5.50	1.71@1.74½	4.89@5.15
Jan. 20	5.50@6.25	1.71@1.79	5.00@5.65
Feb. 18	5.80	1.78@1.86½	5.14@5.50
Mar. 18	5.00@5.25	1.80@1.86½	5.40@5.65
Apr. 22	5.25	1.77@1.86½	5.90@5.93
May 19, 1926	5.25@5.70	1.82@1.86½	6.15@6.38

Other Ports

Boston, coal, per ton...$7.27
Boston, oil, f. a. s., per barrel...$1.81
Hampton Roads, coal, per ton, f.o.b., piers...4.75-5.00
May 10—Cardiff, coal, per ton...17s 6d
London, coal, per ton...24s 6d
Antwerp, coal, per ton...21s 0d
Antwerp, Fuel oil, per ton...77s 6d
Antwerp, Diesel oil, per ton...97s 6d
British ports, Fuel oil...72s 6d
British ports, Diesel oil...87s 6d

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